

LL

KF 27

.I7

1930

Copy 1





# Economic Survey of Certain Federal and Private Irrigation Projects

---

## HEARINGS

BEFORE THE

U.S. Congress. House.

COMMITTEE ON IRRIGATION AND RECLAMATION.

HOUSE OF REPRESENTATIVES

SEVENTY-FIRST CONGRESS

SECOND SESSION

MARCH 6, 1930



UNITED STATES  
GOVERNMENT PRINTING OFFICE  
WASHINGTON : 1930

## COMMITTEE ON IRRIGATION AND RECLAMATION

ADDISON T. SMITH, Idaho, *Chairman*

SCOTT LEAVITT, Montana.

PHILIP D. SWING, California.

SAMUEL S. ARENTZ, Nevada.

ROBERT R. BUTLER, Oregon.

FRED G. JOHNSON, Nebraska.

VINCENT CARTER, Wyoming.

THOMAS J. HALSEY, Missouri.

DON B. COLTON, Utah.

C. B. HUDSPETH, Texas.

WILLIAM C. LANKFORD, Georgia.

MILES C. ALLGOOD, Alabama.

EDWARD E. ESLICK, Tennessee.

JOSEPH WHITEHEAD, Virginia.

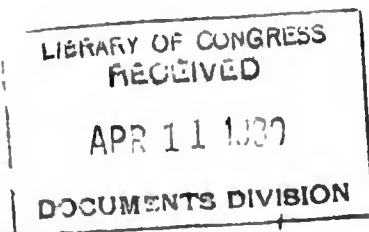
ROBERT S. HALL, Mississippi.

D. D. GLOVER, Arkansas.

NUMA F. MONTET, Louisiana.

WALTER S. SMITH, *Clerk*

II





R.V.S. May 13-30.

HIN 721  
1930

## ECONOMIC SURVEY OF CERTAIN FEDERAL AND PRIVATE IRRIGATION PROJECTS

THURSDAY, MARCH 6, 1930

HOUSE OF REPRESENTATIVES,  
COMMITTEE ON IRRIGATION OF ARID LANDS,  
*Washington, D. C.*

The committee this day met in the committee room, House Office Building, at 10.30 o'clock a. m., Hon. Addison T. Smith (chairman) presiding.

The CHAIRMAN. This meeting is called for the purpose of having the Commissioner of Reclamation, Dr. Elwood Mead, discuss an economic survey of certain Federal and private irrigation projects. I will read a letter from the Secretary of the Interior addressed to me on the 6th of January:

(The letter reads as follows:)

JANUARY 6, 1930.

HON. ADDISON T. SMITH,  
*Chairman Committee on Irrigation and Reclamation,  
House of Representatives.*

MY DEAR MR. SMITH: Last year the Bureau of Reclamation of this department, on its own initiative, made an economic examination of a number of reclamation projects, both Government and private, with a view to determining what could be done to promote development of unused land and give better opportunities to the settlers. The bureau was fortunate in securing the services of some very able economists and agricultural leaders outside of the Reclamation Service, and outside of the irrigated area, at nominal expense. Their conclusions represent the disinterested judgment of able and impartial minds and commend themselves to the department and to the bureau as being worthy of consideration by Congress and the interested public.

A copy of their report is attached. The department proposes to issue it as a bulletin of the Bureau of Reclamation.

Very truly yours,

RAY LYMAN WILBUR.

The Commissioner of Reclamation is present this morning and we will be glad to hear from him.

### STATEMENT OF DR. ELWOOD MEAD, COMMISSIONER OF RECLAMATION

Doctor MEAD. Mr. Chairman and members of the committee, I want to express my appreciation of your willingness to give some time to this matter this morning and to say that the main purpose of my talk to you is to express my belief that there is need for a personal study of certain reclamation projects on the part of this committee, or some of its members, and of the other committee that has to deal with it, the Appropriations Committee, in order that Con-

gress may get a first-hand knowledge of the conditions. I hope arrangements will be made for such a study this summer. For several years I have believed that it would contribute greatly to the success of Federal reclamation if the conditions and problems of some of the difficult projects could be studied by these committees on the ground.

The continued increase in the cost of reclamation, and the continued difficulty of farmers everywhere to overcome the increased expense of farming brings up the necessity for doing everything we can on reclamation projects to give whatever assistance can be given wisely to the farmers on those projects in hastening development and providing for the cost.

These matters were made the subject of investigation and analysis last year by a body of able and experienced men and their recommendations are to be found in the economic report which has been submitted to your committee.

That report deals only with projects which are in difficulty and embraces only 16 $\frac{3}{10}$  per cent of the irrigable area included in the reclamation projects receiving water from the works of the bureau. To consider this report as typical of reclamation conditions would therefore be a mistake. What it describes, and the recommendations it makes, deal only with the difficult conditions which reclamation encounters. It was believed to be necessary at that time to prevent misconception, to make a statement of general conditions of reclamation and of the monumental contribution that Federal reclamation has made and will continue to make to the wealth, the agriculture, and the commercial success of the whole Nation as well as the arid States. Some of these results are as follows:

In 1929 the cultivated area receiving water from Government works was 2,716,450 acres, producing crops value at \$161,272,430. From the time that water was first available in 1906 for crop production the cumulative value of crops grown on land furnished water from the works of the bureau has amounted to \$1,642,360,000.

The total value of livestock in 1928 on about half the area, for which statistics are available, was \$27,700,000, and that of farming equipment \$14,363,000, or a total stock and equipment value of \$42,063,000.

Serving the projects and adjacent areas are 17 beet-sugar factories, which in 1928 produced more than 500,000,000 pounds of sugar and paid \$12,800,000 for beets, about \$5,500,000 having been paid to the water users on the Federal projects.

Shipments to stations on 17 of the 24 operating projects in 1928 numbered 95,496 carloads valued at \$119,619,000, and shipments from stations on these projects totaled 112,608 carloads valued at \$158,295,000.

In 1928 the 40,788 irrigated farms on the Federal projects for which statistics are available had a population of 153,663, and the 212 project cities and towns an additional population of 451,811. There are on these projects 687 schools, 689 churches, and 136 banks with deposits of \$147,732,900 and 248,373 project and nonproject depositors.

It is estimated that the increased value of lands and other properties on farms and in towns within the enterprises watered from the works of the bureau amounts to at least \$500,000,000.

The total repayments to the Government by the water users on construction and on operation and maintenance during the fiscal year 1929 were \$6,308,314, of which approximately \$4,388,000 was for construction. The construction repayments in 1928 were \$1,108,000 more than in 1927, and in 1929 were \$1,142,000 more than in 1928, or an increase of \$2,250,000 in two years.

There is general agreement that the engineering operations of the bureau have been well conceived and capably carried out. They have resulted in the construction of 118 storage and diversion dams, 16,557 miles of canals, ditches, and drains, 148,462 canal structures, 11,631 bridges, 14,042 culverts, 4,811 flumes, 1,203 miles of roads, 3,350 miles of telephone line, and 2,056 miles of transmission line. Excavation of earth, rock, and indurated material amounts to 276,822,500 cubic yards.

The results of reclamation on the Rio Grande project, New Mexico-Texas, are typical of those which may be found on a large number of the Federal irrigation projects.

The agricultural investment in the Rincon and Mesilla Valleys in New Mexico and the El Paso Valley in Texas, under the Rio Grande irrigation project, is \$45,501,116. This investment is represented in detail as follows: Agricultural lands, \$16,006,759; preparation of lands for irrigation, \$6,118,033; farm improvements, \$6,091,556; farm equipment, \$750,832; livestock, \$1,693,228. The cost of irrigation works was \$14,830,708. In 1914 the value of the crops produced on this area was \$2,338,316 and the cultivated acreage 64,724 acres. In 1928 the value of the crops had increased to \$12,808,287 and the cultivated acreage to 159,598 acres. Livestock products are not included. There now are 4,728 farm homes and a farm population of 22,569. There are 37 towns in the district with a combined population of 144,076. The Elephant Butte Dam, which supplies the water for this project, was completed in 1916. Since then the growth of the district has been remarkable.

It is important that a discussion of the problems of reclamation and of the means for enhancing its opportunities for the home seeker and for increasing the financial income of both the farmer and Government should not be misconstrued as evidence that reclamation has not succeeded in the past. On the contrary, the judgment of the future is certain to be that no expenditure that the Government has ever made has brought larger returns, either in the opportunities it has created for the individual or in the enhancement of national wealth. This seems an appropriate place, therefore, to express the belief that reclamation has been subjected throughout its history to requirements that do not apply to any other governmental activity.

Reclamation from the first has had to deal with the most difficult conditions of the West. The easier projects have been taken up by private enterprises. The difficult ones have been left for the Federal Government. Reclamation has had to create an agriculture, an organized society, where nothing existed before. To say that it should be a demonstration, an experiment, and at the same time should not lose any money, is a test that would close the Agriculture Department within 24 hours. Its experiment stations are not expected to and do not pay expenses, yet the Government, in reclamation, has taken on a great experiment under the most difficult conditions.

What the financial result has been is shown by the simple statement that the total expenditure on construction has been about \$190,000,000. While that money was spent to bring people into solitudes and create agriculture in deserts, it is nothing short of marvelous that we are able to say that the value of crops grown on these projects last year was \$161,000,000, or almost equal to the entire construction output, or to the amount now due the Government under the water-users' contracts.

It seems desirable that Congress and the country should have the production record in 1928 and 1929 as a part of the general picture of what Federal reclamation has accomplished, and this has been incorporated in a table which I desire to submit.

What these projects are contributing to the wealth of the country is a most important index of the worth of the reclamation policy, but the financial returns, the willingness and ability of the people under these projects to pay back the money invested by the Government, is equally important as indicating the fidelity with which the act is being administered. As an indication of its ability to continue to provide the means for the conservation of our waste water and the creation of new homes in desert lands, I wish also to incorporate another table showing the status of construction-account repayments at the end of the last fiscal year.

We venture the prediction that this showing of payments will equal that of private irrigation projects, and also that of banks which provide credit for the farmers of this country, and that, considering the uncertainties and vicissitudes that go with new development, it is a record in which the whole country can take pride and satisfaction.

Nevertheless, the writers of this report believe that the operations of reclamation can be greatly improved; they believe that there is certain legislation that ought to be enacted, and with that I am in complete agreement. However, before that is attempted, I hope that your committee can make a first-hand study of some of the conditions dealt with in that report and of some of the conditions which I encountered on a recent western trip.

I had to deal with two of the most difficult problems of reclamation of old projects and with one of the most difficult problems of construction in the future. The first of these involves the financial and economic improvement of the Uncompahgre project, which is one of the first undertaken under the Reclamation Bureau. It was a project in which the Government took over a number of private canals and a partly settled and developed section of the country. Its economic success has been endangered by an early speculative inflation of land prices, by which many of the present settlers incurred debts in the purchase of their farms beyond the intrinsic worth of the land. It was endangered by the fact that a large area of unfit land was included within the project, because at that time the importance of soil surveys and land classification had not been disclosed. In 1926 the Government corrected the conditions created by the neglect to classify the land by relieving the project of any obligation to pay for irrigation on unfit land, and by so doing practically cut the debt of the project in half. It also extended the period of payment. This, however, did not relieve the farm owners

of their mortgages and other indebtedness. This year financial conditions were injured by the failure of a bank on the project, which caused loss to many farmers, and a movement was started to get relief from the easiest creditor, the Government, by a further write-off of the project debt. That movement was not started by the district board or by people active in the management of the project and who have been in close personal contact with the Reclamation Bureau. It was started by some of those who have suffered from economic conditions which have little relation to payments for irrigation.

The agricultural college and this bureau have been studying these economic conditions during the past year, and before this agitation began we took up with the State authorities the importance of bringing about an improvement of conditions. Anything that reflects on the success of a reclamation project reflects on every irrigation project and on every irrigation security in that State, public or private. Furthermore, the most difficult conditions were not those which properly belong to the Reclamation Bureau, and with that in view, Secretary Wilbur sent an invitation to 16 individuals and agencies that have a direct concern in irrigation and in the success of Federal reclamation to attend a conference in Denver to discuss plans for the rehabilitation of the Uncompahgre project. His invitation included representatives of the project, of the State government, of the agricultural college, of the railroad, and of the banks. Following his letter of invitation, I sent to the different members of the Denver conference the following letter, outlining the conditions and what steps are necessary for the successful reconstruction and future growth of the project:

From: Commissioner.

To: Members of the Denver Conference on the Uncompahgre project, February 25, 1930.

Recent conferences with the Secretary of the Interior and Members of Congress indicate a belief that the best results in reclamation require a greater measure of cooperation between the States and the Federal Government than has existed in the past. Such cooperation is regarded as the necessary basis for the reorganization of the Uncompahgre project.

The Federal Government has gone as far as it can, under present legislation, to assist the project. Nearly \$3,000,000 of the construction expenditure by the Government has been written off and the repayment period has been extended to 40 years. Furthermore, it is not the Government charges alone which have held the project back, but these combined with high taxes, high interest rates, high freight rates and the absence of any active agency for the settlement and development of unoccupied lands. To put this project on its feet the reorganization plan should include:

- (1) Delinquent State and county taxes should be written off or rebated.
- (2) An organization should be formed to take options for the sale of abandoned farms at reasonable prices and with long terms of payment to settlers.
- (3) The State, the railroad and the Bureau of Reclamation should join in an active advertising and settlement campaign similar to that which has brought about such changed economic conditions on the Belle Fourche and Lower Yellowstone projects, and is giving such help to the Willwood development.
- (4) A contract including a provision for drainage should be signed before the Bureau goes to Congress with the proposed refinancing plan. A draft of such contract will be prepared for consideration at the meeting in Denver on February 25.

All of the above are necessary to successful reconstruction and future growth of the project. Their inclusion is regarded as essential to securing prompt and favorable action by Congress.

I am bringing these matters to your attention in order that they may have consideration in advance of the conference.

ELWOOD MEAD.

At the Denver conference the crucial problem of this project was discussed. It is that of a huge mortgage indebtedness and a ruinous high interest rate on these lands. The real estate mortgages on 37,000 acres of land total \$2,500,000, or nearly \$70 an acre. The average interest rate on this is 8 per cent, or a yearly interest payment of more than \$5 an acre. The chattel mortgages, which cover yearly financial operations, including livestock and feeder loans, are \$2,300,000, with an average interest rate of 9 per cent. Farming in no part of this country will stand these interest rates, and the paramount need of this project is a better credit system with an interest rate of not to exceed 6 per cent. Wiping off of the Government debt will not give stability and security to the owners of these farms.

Mr. COLTON. Doctor, those liens are not prior to the Government liens, are they?

Doctor MEAD. No; but they find it impossible to pay the mortgage on these farms and they can approach the Government for a remittance of its debt much more easily than they can the mortgage company or the holder of the other claims. Had it not been for the failure of this bank they probably would never have said anything, because I was out there last spring and midsummer and visited the projects and know the feeling at that time; but when the bank failed and some of the farmers on the project lost all their money and it meant that certain mortgages that that bank held would be pressed for collection, an appeal to the Reclamation Bureau as one understanding conditions and in a position to help was made. In part also because some water users were in arrears in their payments and could not go on without a further extension. We found that 60 per cent of the land in the project had paid its charges for this year, and probably a considerably larger percentage will pay, so that these delinquencies are only a small percentage of the project.

Mr. ESLICK. Does each piece of property stand good for its own pro rata payment, or is all the property bound to the Government?

Doctor MEAD. Yes; that is a community debt; that is a joint liability.

Mr. COLTON. Doctor, to what project are you referring?

Doctor MEAD. This is the Uncompahgre project. It is in the State of Colorado and takes its water from the Uncompahgre River. It is over on the western slope and is supplied in part by the Gunnison River.

Mr. JOHNSON. What is the nearest town?

Doctor MEAD. Montrose is the largest town on the project; and Grand Junction is the nearest town outside the project.

Mr. CARTER. That is north of it, is it not?

Doctor MEAD. Yes. In the settlement in 1926 it was required that the delinquent payments of interest, and payments on water, that were not included in the adjustment, should be paid within the next five years, and those that have been unable to make those payments would not be able to get water this year because they were more than one year delinquent. It was impossible to do any-

thing that would be effective before the irrigation season. There was unanimous agreement to the proposal made by the bureau that Congress be asked to pass a resolution giving every irrigator water this year who would pay the entire charges for this year—one full payment—that is, they would pay the construction charge and the operation and maintenance charge so that there would be no loss to the Government, and that would give time to consider a number of matters.

I wish the project could be visited by a committee of you gentlemen. Among the things they need is an arrangement for settlement and cultivation of lands that are either held by the county for taxes or which have become delinquent in their county taxes, and subject to sale. They should be placed in such condition as to title that they could be sold to newcomers who would take them up, improve and develop them. Possibly this situation can be dealt with by the local chambers of commerce, or county organizations. They are going to do that. Then there has been a loss of area and a loss of revenue because certain lands have become waterlogged through seepage. Those lands ought to be drained, but it will require action by the district to assume the obligation for drainage. That action has not been taken because they have been discouraged.

MR. COLTON. Quite a percentage of the lands are of an alkali nature, are they not?

DOCTOR MEAD. I think all of the alkali lands were excluded in the adjustment of 1926. There was a great deal of it, but that land has all, or nearly all, been cut out.

MR. LEAVITT. Has the question of new people coming onto this project been gone into?

DOCTOR MEAD. That was one of the things we discussed at Denver.

MR. LEAVITT. Do they feel that they can secure buyers under those conditions.

DOCTOR MEAD. I think they can find buyers for it.

MR. ESLICK. Doctor Mead, what does that land grow that makes it so valuable?

DOCTOR MEAD. It is a good grain country; it is good potato country; it is good sugar-beet country.

MR. COLTON. It will grow alfalfa, onions, and so forth.

MR. JOHNSON. Do they raise a lot of head lettuce there, too?

DOCTOR MEAD. I do not think they do.

THE CHAIRMAN. What is the acre charge on that land for the original cost?

DOCTOR MEAD. The construction charge was reduced under the adjustment of 1926 to \$52 an acre.

THE CHAIRMAN. And what is the annual operation and maintenance charge?

DOCTOR MEAD. I think it is about \$1.85.

THE CHAIRMAN. In view of the small cost, and the small operation and expense, the fertility of the soil, it is rather difficult to understand why they can not pay, when it is remembered that people on other projects are paying where the cost is twice as much, and where the operation is twice as much.

MR. ARENTZ. But Mr. Chairman, if they owe \$4,000,000 in mortgages on which they are having to pay 8 and 10 per cent interest,

when that is added to the operation and maintenance cost you have a different situation.

Doctor MEAD. That is the reason.

Mr. JOHNSON. How much per acre does that \$4,000,000 amount to as proportioned among the total acreage; how much would it be?

Doctor MEAD. There are less than 70,000 acres in the project.

Mr. COLTON. Do all these mortgages carry 10 per cent?

Doctor MEAD. Most of them are at the rate of 8 per cent. I do not think that any real-estate mortgages carry 10 per cent. Some chattel mortgages do.

Mr. ARENTZ. Do you know what the taxes per acre amount to?

Doctor MEAD. About \$2.

Mr. ARENTZ. Then on top of that they have a dipping charge and the consolidated school charge. These charges in my county bring it up to an amount which is indeed a burden.

Doctor MEAD. Yes.

Mr. ARENTZ. Which makes it almost prohibitive.

Doctor MEAD. They have a lot of things to discourage them and a lot of things that need to have attention.

Mr. COLTON. Are those lands assessed at 100 per cent of their value? That is very unusual, if it is true.

Mr. ARENTZ. Ordinary alfalfa land is assessed at about \$60. First-class alfalfa land is assessed as high as \$80.

Mr. COLTON. The total tax would be about \$1.20.

Mr. ARENTZ. It would be about \$1.60 or \$1.75; and other taxes would bring the total far above this figure.

Doctor MEAD. Unquestionably, it is a situation on which they need help.

Mr. ARENTZ. That is the reason you brought out the fact that study is necessary to get the complete picture.

Doctor MEAD. Yes. We have sent there Mr. Sanford, who is making investigations similar to those made by Mr. Kreutzer and Mr. Hayden to help find out what ought to be done; and they have a fact-finding committee of which the president of the agricultural college is the chairman. On the committee also is Mr. Walter, our chief engineer, representing the bureau; Mr. Foster, the colonization commissioner of the State, representing the State; Mr. Harrison, president of the Denver Bank, representing financial interests; and two members from the project, Mr. Dale, the chairman, and another former chairman, Judge Bruce. They are working on the economic improvement of the project. It is not their idea of evading the debt to the Government, because the unanimous opinion of the Denver meeting was against writing off a dollar of the obligation to the Government. Scaling down their obligations to the Government, that was not a district idea. That was the thought of some of the harassed people on the project—and they had encouragement in part from the fact that the Mississippi River people, as they say, are being protected without cost; that it has been proposed to build reservoirs without cost, so why not just quit paying altogether and have everything done without cost.

Mr. COLTON. That would be a peculiar situation.

Doctor MEAD. It is a situation that confronts them and that we must meet in such a way that they will feel that we are not dis-



criminating against them. I find the tone of quite a lot of correspondence to be "Why don't you join in with these movements for free drainage and free reservoirs, and free everything else, and relieve us of all these burdens?"

I do not believe in it. I do not believe it is feasible; and I do not believe in it as a matter of principle. I think that we ought to do what we are doing.

Mr. COLTON. Do they point to the Mississippi plan as a free contribution by the Government for the benefit of the settlers down there?

Doctor MEAD. Yes.

The CHAIRMAN. That is their stock argument.

Doctor MEAD. The State and bureau are going there this summer to help reconstruet that project; and we hope to do it in such a way that it will bring about a new psychology and a new prosperity.

The CHAIRMAN. Did you have an opportunity, Doctor, to confer with the governor, or any of the prominent members of the legislature to sound out sentiment with regard to the State operating for the benefit of these people?

Doctor MEAD. Yes; and it is favorable. It is now just a question of determining how it is to be done. The governor appointed this committee of five at the request of President Lory; and we were asked by the association itself to confer with the governor. Both sides felt it was desirable that the governor should appoint the committee; and he did.

The CHAIRMAN. Of course, you would find a disinclination on the part of the farmers on all these other projects to have themselves held responsible in the way of taxation to provide substantial relief for the benefit of these people who have been subsidized, as they say.

Doctor MEAD. There would be an objection on the part of the farmers to any considerable expenditure by the State to improve conditions here, but I do not believe anything of this kind is necessary. If better credit and lower interest rates can be provided, settlement promoted, and the lands injured by seepage drained, the project ought to meet all its obligations. Not only would there be an objection on the part of farmers outside the project to contributing to the reconstruction of this project, but one of the chief difficulties on the project is to get people who have no need for draining their land to assume any responsibility for drainage, although all must realize that every additional acre added to the area that pays charges lessens the burden on others. Instead of favoring this, there is a strong sentiment on the project for getting rid of joint liability. Vigorous objection to joint liability was made at the Denver conference and in resolutions adopted by the water users. If it is to be abandoned, then something adequate must take its place; and it is believed that this will be realized before the investigations to be made this summer are completed.

While at Denver we met with the representatives of the Orchard Mesa district—and I am bringing this up because it illustrates the questions which confront reclamation to-day. In a sense, they are new questions. The Orchard Mesa project was a private project. After the works were completed their pump and the flume leading to it entirely collapsed, and they had to have a new flume and a new pump. They had no credit. They appealed to the Federal Bureau,

and Congress voted \$1,000,000 for reconstructing these works. The project on its part, which was a district, signed a contract with the Government to repay that money in 20 years.

We have had two committees appointed by the secretary to examine it, and those committees included in their membership people outside the bureau. That situation is dealt with in the economic report. Without talking about the various recommendations, this is the situation: The contract with the district provides that every acre of land shall make the same payment to the Government. About two-thirds of the land has been making the payment and one-third has not been from the time we started the pumps going.

The upper end of that project is peach land. The raw land there sells for \$1,000 an acre, and improved farms for \$1,500 an acre and returns as high as \$600 and \$700 an acre from mature orchards. There is another section that is good farm land but not fruit land. Because of frost they can not grow peaches. Then there is a poorer section. There is no reason for dropping the yearly payment to what the poor land can pay, because that is making water too cheap for the good land. As an outcome of the conference the district, the bureau, and the college of agriculture have representatives on a committee of three classifying the district land and will endeavor to fix charges for each that will conform closely to the productive value of water. It means graduated payments. I think that is what we must regard as one of the inevitable adjustments growing out of high acre charges.

Mr. ESICK. Has your department power to make these contracts, or does it require additional legislation?

Doctor MEAD. There is a question as to that. In this instance this adjustment of charges does not depend on the Federal law; it depends on the State district law of Colorado. Our belief is that it is broad enough to permit this. Mr. Dent, who attended the conference, believes we could make this adjustment.

Mr. ARENTZ. You think the trouble is not that there are shiftless farmers on the poor section of the project?

Doctor MEAD. No.

Mr. ARENTZ. The farmers themselves, then, are not to blame.

Doctor MEAD. No; but it is only human nature for them to wish to secure as low a rate as possible.

Mr. ARENTZ. Your idea is that there should be a basic rate and that as soon as poor land becomes improved and gets into the category of high-income bearing land, its basic rate should be changed to a higher rate?

Doctor MEAD. I want to abolish the flat rate entirely and have a graduated charge according to value. What I would like to have is for them to pay as they pay in districts in certain other sections of the country, according to the value of water which could be fixed from year to year, or at least once in five years. That is what we discussed—a revaluation every five years.

Mr. LEAVITT. Outside of the reclamation service, all other improvements as far as I know, under State law are taxed according to assessed valuation. That would produce the very result you are seeking.

The CHAIRMAN. We tried out this graduated-payment plan based on crop returns. While it was theoretically right it is hard to operate. I would not propose a return to that.

Mr. LEAVITT. Is that working out to be a complete failure on those projects where contract was entered into?

Doctor MEAD. It is. There is the constant temptation on the part of people not to return crops at all, or to keep cutting down prices. We have to make our own crop census.

The CHAIRMAN. It all comes back to the question of how you are going to determine what rates shall be paid.

Doctor MEAD. You can take the tax valuations. That is a very good indication of relative values.

Mr. LEAVITT. However, I do not think it would be a wise thing for you to have two different classifications, one of the Federal Government and one of the local county government.

Doctor MEAD. Some change is necessary, because the present situation does not work at all.

Mr. SWING. It seems to me it would be a very good thing, as suggested by Mr. Leavitt, to accept the local appraisalment. It is all a question of relativity.

Doctor MEAD. Yes; that is all it is.

Mr. SWING. Base the tax upon the appraised value of these lands. Then, if you want to raise a gross aggregate of a certain amount, it is merely a matter of division to arrive at what the assessment rate should be in order to produce the amount you must have. In such a situation the local authorities themselves have said that the relative values are fair.

Mr. ALLGOOD. They are all tax specialists.

Mr. SWING. Yes. That is a fair and just proposal.

Doctor MEAD. It is because of these various considerations that enter into the picture that I want this committee to make a trip to get first-hand information on the subject.

Mr. JOHNSON. You say these mortgages bear 8 per cent interest?

Doctor MEAD. Yes.

Mr. JOHNSON. Is there no provision of the farm loan law that will apply to these cases?

Doctor MEAD. I do not think there are any Federal farm loans on this project.

Mr. JOHNSON. I should think these loan companies would be willing to make a lower rate than that to help these fellows out; 8 per cent is a very high rate of interest.

Mr. ESLICK. Why is it that loan companies charge 8 per cent on that kind of an investment whereas in my section, in the border States, they lend you money up to 50 per cent of the value of the land at  $5\frac{1}{2}$  per cent?

Mr. JOHNSON. We are able to get money at 5 and  $5\frac{1}{2}$  per cent in Nebraska. It seems to me that 8 per cent is an unreasonable rate of interest.

Doctor MEAD. The burden would be heavy even though it were 6 per cent.

Mr. JOHNSON. But 8 per cent makes it that much heavier.

The CHAIRMAN. Doctor, have you very many projects that are in such financial stress as the Uncompahgre project?

Doctor MEAD. No.

The CHAIRMAN. Of course, the Uncompahgre project has been urging relief of some kind.

Doctor MEAD. I do not believe that we have many that are as bad off as Uncompahgre.

The CHAIRMAN. Do you have any trouble on the Boise project?

Doctor MEAD. No.

The CHAIRMAN. And you have none on the Minidoka project.

Doctor MEAD. And we are not proposing to consider those.

The CHAIRMAN. Of course, we are having trouble with the King Hill project.

Doctor MEAD. Yes. These are some of the difficulties on the old developments. We want to help the people that are there and to make it possible to reestablish those farms that have either been sold under tax sales or in some other way taken out of the projects, to get good farmers on them again and to get this drainage matter cleared up. I think if we can do that that the Uncompahgre project is going on making its payments. I do not think it needs anything more than that—just a little encouragement, stimulation, and direction from the outside to help them through it; and with Orchard Mesa we must have a change in the method of assessing the charges.

I went to Casper, Wyo., to look at the Casper-Alcova project. We have been making an economic study of that project during the last year. We have made other studies of it because it presents serious questions, owing to the very high acre cost. There are a number of reasons why part of the water of the North Platte should be used in irrigation in that part of Wyoming. It is a stream that is fed by Wyoming mountains. Wyoming is a dry State and it needs irrigated land as a basis for the stock-raising industry to furnish winter feed for stock, but because development of the lower part of the stream was easier than the upper, development has proceeded on that portion. The time has come when we ought to have some irrigation of the upper sections of the stream, and more irrigated farms in the central part of the State.

If we are going to incur heavy cost, we want to do things that will enable people to pay them. We do not want to shut our eyes to the obligations settlers will have to assume and make them so heavy they can not be met.

That matter was discussed candidly. We had the governor, we had the representatives of the university, we had our own engineers that had been making these studies, and among the things proposed—and this comes from the people of Casper—is that Casper should be included in the district and should contribute toward making these payments. Casper is the largest city in Wyoming. That plan has been followed elsewhere, and in this instance is a case where it ought to be done; and it is altogether good that we are willing to do it.

To those of you that have read the latest economic report it will at once be apparent that the thing we most need is credit. Lack of credit is the fundamental weakness of our reclamation law as it stands to-day. That is a thing that every other country in the world that has a reclamation system has provided for, but we have not. There is great urgency for this; and in a letter that I wrote to Casper

I proposed that the State furnish a fund of \$1,000,000 to be loaned to settlers to help improve their farms.

Mr. SWING. In the interest of colonization?

Doctor MEAD. Yes; and that State would be amply repaid for making that kind of an investment.

The CHAIRMAN. Did you get a response to your letter?

Doctor MEAD. We went there and talked it over. The State has about \$6,000,000 of farm-loan money obtained from oil and land leases—oil largely—and it is carrying on a very intelligent policy. However, I think their law will have to be changed to meet the situation as to these settlers.

Mr. LEAVITT. Which State was that, Doctor?

Doctor MEAD. Wyoming.

Mr. SWING. You say they have loaned to settlers on the reclamation projects?

Doctor MEAD. No, sir; they were farm loans.

Mr. SWING. They did not loan in the case of reclamation projects because they could not get a first lien on the land.

Doctor MEAD. That is it; and that is the thing that confronts them now. A farm loan is made on the basis of ownership of the land. If this loan is to be made, and it ought to be made, it must be based on prospective income. To get a farm loan requires a fully developed farm, and you must have income already established. With the situation we are considering money must be loaned to help develop the land and some chance must be taken on the man. The thing that must be determined is whether the land will produce income.

Mr. SWING. In other words, in the present situation of the public lands, all the cheap, fertile, and easily cultivated lands have been taken up, and what remains now is the land that is difficult to actually put into crop and improve; land that needs irrigation and considerable capital investment in order to make it productive.

Doctor MEAD. Yes.

Mr. SWING. Therefore, if a man is not rich he is not able to go on it, and if he is rich he does not want to.

Doctor MEAD. Yes.

Mr. SWING. Therefore, if you are going to get settlers on that kind of land you must find some way of helping them finance themselves until they get production and crops started?

Doctor MEAD. Yes. It developed in conversations there in conference and outside that there was a good deal of misgiving as to how the State of Wyoming would regard this proposal, whether the outlying districts would not be opposed to it and that the action taken might be defeated, politically, in the State. It is one of the things that we want to canvass; we want to develop public opinion; we want the whole situation understood. Nothing will help more than to have this committee make a visit to the State.

Just north of Casper is Riverton. The Government has spent \$4,000,000 on the canals of the Riverton project. It has provided water for about 40,000 acres. It has built main canals for 20,000 more; and it has built a main canal reaching from the river down to the project that will carry water for 40,000 acres beyond that, or

100,000 acres in all; but we have 40,000 acres ready and have 18 settlers on it.

Mr. COLTON. How many?

Doctor MEAD. Seventeen or eighteen. We have land provided with water for two or three hundred.

The CHAIRMAN. And you only have 17 on it.

Doctor MEAD. Yes. The difficulty is distance to a railroad. Settlers have not gone on that project because if they go there they must ultimately become sugar-beet growers—that is to be the money crop on that project, for it is in a country where beet growing seems to be especially favored; but this project to-day is from 12 to 28 miles from a railroad. The part that now has water is from 12 to 28 miles from a railroad and the other 40,000 acres would be still farther removed from any existing railroad. There is no use trying to induce people to come so far away from transportation.

The CHAIRMAN. Was a railroad contemplated when they set aside the project?

Doctor MEAD. That was before my time, but I suppose it was. I mean to say that I inherited this with the main canal already built.

Mr. ARENTZ. Is this one of the so-called political projects?

Doctor MEAD. No, I do not think so. I think the project is fairly justified on economic grounds. There is plenty of water; they need more irrigated farms. We have had it examined by the university authorities and by half a dozen different bodies. The department has made a very careful soil survey, and there is no question but that it is good agricultural land.

Mr. LEAVITT. It is all right except for the lack of transportation.

Doctor MEAD. Yes. The lack of transportation is the sole obstacle.

Mr. ALLGOOD. What crops are produced there?

Doctor MEAD. Alfalfa, which can not be shipped out on account of freight rates; it must be put into stock, dairying, and things of that kind. The best money crop there would be sugar beets. They have two factories already in the valley.

The Northwestern is the nearest railroad. They have said that if we would establish a sugar factory there they would put a branch line in. It will take about 25 miles of a stub line to go up the valley from either the Burlington or the Northwestern.

The CHAIRMAN. How are the finances of the project being taken care of by these few settlers?

Doctor MEAD. They are not being taken care of by the settlers but are being taken care of out of the reclamation fund. We are losing money.

The CHAIRMAN. We must be.

Doctor MEAD. We are.

The CHAIRMAN. It is operating for the benefit of these 17 settlers. Was there ever a time when there were more settlers there than now?

Doctor MEAD. No.

The CHAIRMAN. The project has not really been settled.

Doctor MEAD. No, it never has been. This was originally an Indian project; that is, it is on what was part of an Indian reservation.

The CHAIRMAN. What does the water cost there?

Doctor MEAD. Water is cheap—\$85.

The CHAIRMAN. How do you account for the farmers not taking advantage of this opportunity?

Doctor MEAD. They will not go so far from a railroad.

Mr. ALLGOOD. It is due to lack of transportation. How are the highways?

Doctor MEAD. They do not have them.

Mr. ALLGOOD. How do you get in there at all, then?

Mr. CARTER. There are no improved highways.

Mr. ALLGOOD. Can you get in there by automobile?

Doctor MEAD. Yes. The traveling is very good when it is not muddy. When it is muddy it is bad traveling over those dirt roads; but it is a fine country.

Mr. COLTON. I live 120 miles from a railroad, and we have a very thriving community.

Mr. ALLGOOD. What are the chances of the State building a highway in there?

Doctor MEAD. The State will build highways, but we need a railroad. That is what the people will want. While I was in Casper, the Burlington made an examination; there were eight Burlington officials with representatives of a sugar-beet company. One of the sugar companies has agreed to build a factory on the project whenever we get settlers enough to grow 6,000 acres of beets.

Mr. SWING. Do not these railroads have colonization bureaus?

Doctor MEAD. Yes.

Mr. SWING. Can they not be interested in helping advertise this project?

Doctor MEAD. They will advertise; but we do not want to advertise until we have a railroad.

Mr. SWING. You are getting back to the age-old question of which came first, the hen or the egg.

Doctor MEAD. Well, the hen comes first. We put \$4,000,000 in to provide water. As soon as the settlers come in they can get it. Now it is time for the railroads to come in.

Mr. COLTON. You say they have a sufficient water supply?

Doctor MEAD. It is good land; there is a good water supply; there is a good climate. Now we must have a railroad. Irrigation differs from what it used to be. We can not consider that we have a solvent project until it is settled and has an income from farms.

Mr. ALLGOOD. What is the price of that land, Doctor?

Doctor MEAD. The greater part of it is public land. The land is free.

Mr. SWING. The price of the land is just the actual charges representing the investment of the Government in the irrigation work.

Doctor MEAD. Yes, plus \$1.50 for the Indians. It was an Indian reservation when we took over this project.

The CHAIRMAN. Most of the projects in Indian reservations are under Indian Bureau supervision. I am wondering how this comes to be excepted.

Doctor MEAD. Because it was taken over by the Reclamation Service and the land has been withdrawn from the Indian reservation.

The CHAIRMAN. Do you pay the Indians anything for it at all?

Doctor MEAD. Provision was made that they should be paid \$1.50 per acre for the land.

I have every confidence that if a railroad were put in there we could get a very large settlement this year but we will not invite people in saying they are going to get a railroad when we do not know whether they are going to or not.

Mr. LEAVITT. What is the prospects from the railroad's point of view?

Doctor MEAD. That it is going to be good business to build in there; that it is going to be a permanent and prosperous community.

Mr. SWING. Can you not get a railroad to see that if they build a line in there it will bring settlers and create business for them?

Doctor MEAD. We have not yet.

The CHAIRMAN. What is the nearest railroad point?

Doctor MEAD. There are two roads—the Burlington and the Northwestern, each equally close to it.

Mr. SWING. Equally close, but are they equally reasonable in cost of construction?

Doctor MEAD. Yes.

Mr. SWING. Both?

Doctor MEAD. I do not think there is much difference. Probably the Northwestern could build a little cheaper.

Mr. SWING. It follows an easier grade?

Doctor MEAD. No, not an easier grade.

Mr. CARTER. There is no extraordinary cost of construction there for either railroad.

Doctor MEAD. No.

Mr. SWING. Which railroad has the most liberal policy regarding the extension of its road?

Doctor MEAD. I would not like to say. They are both good roads.

Mr. ESLICK. Doctor, how much did you say the total charge per acre was?

Doctor MEAD. \$85.

Mr. ESLICK. Spread over how long a term?

Doctor MEAD. Forty years.

Mr. ESLICK. That means something like \$2 per acre a year.

Mr. LANKFORD. Would not a highway solve the difficulty?

Doctor MEAD. I do not think so.

Mr. ARENTZ. That would be a first necessity, I should think.

Mr. CARTER. They will not stand up in that country.

Mr. ARENTZ. I do not wonder that neither of the railroads want to build a line in there. I built 40 miles of railroad through an agricultural district in 1909—into a good agricultural district, with a good reservoir, with 90,000 acres of land under cultivation, and the line has never paid, and never will pay.

Mr. SWING. The Santa Fe built down to Palo Verde, and they never have made expenses out of there.

Mr. ARENTZ. Have they any natural resources, oil, gypsum, or some natural product other than agriculture of which they could get tonnage so that they could make their regular trips for the natural resources and hook onto their train a carload of potatoes, a carload of peaches, or other agricultural products? If such a situation exists, they might be able to operate the road without loss; otherwise not.

Mr. GLOVER. What is your plan?



Doctor MEAD. I think it would be good business for them to put a line in there. I am simply bringing this up to show you some of the things we have to consider besides finishing canals. We can not consider a reclamation project a success until we have farm incomes. Two things confront the settlers here—the problem of transportation and the problem of credit.

Mr. COLTON. You are not undertaking now very many reclamation projects where there are no settlers?

Doctor MEAD. No.

Mr. LEAVITT. Doctor Mead, something has been said about a highway possibly solving this difficulty. Are the winter conditions in that country such that a highway would be kept open all winter, or would there be a time when the community would be isolated?

Mr. CARTER. I think the road would be kept open the year round.

Doctor MEAD. There is but a slight snowfall.

Mr. ARENTZ. When you can get ore hauled for 25 miles over a mountain road for \$2.50, and when you have trucks traveling parallel with the railroads throughout the West, as they are doing now, and competing with the railroads, quoting a lower price than the railroads, I think a highway would solve this problem.

Doctor MEAD. That is why I want you gentlemen to go up there this summer and see what the conditions are on the ground.

Mr. CARTER. Doctor Mead, would not the roads have to be built by the Indian Service? Is it not an Indian reservation?

Doctor MEAD. No; it is not an Indian reservation.

Mr. CARTER. I thought it was right in the heart of one.

Doctor MEAD. No. This land has been withdrawn from the Indian reservation, but the settlers will have to pay the Indians \$1.50 an acre for it.

Mr. ALLGOOD. May I ask you, Mr. Carter, whether you have bonded your State for building highways?

Mr. CARTER. We are bonded practically to our limit now. We can only bond ourselves to 1 per cent of the assessed valuation, but we are going to provide a constitutional amendment changing the situation. We are spending a lot of money per capita in road building in Wyoming.

Mr. ALLGOOD. Can you tell me what it costs per mile in that section to build roads? Have you any idea?

Mr. CARTER. No, I do not. I ought to know, but I have no idea.

Mr. ARENTZ. I have a bill in the House now providing for a mile and one-fifth of gravel road across an Indian reservation, and the total cost, including a small bridge, is \$24,000. That will provide a good gravel highway.

Mr. CARTER. It should not cost us much out there.

Mr. ARENTZ. I should say that \$15,000 would be more than ample.

Mr. SWING. A gravel highway will not hold up under truck traffic very long. If you are going to pay \$20,000 for a road for heavy traffic you might as well go the step further to \$30,000 and get a good concrete road.

Mr. ARENTZ. We have a method of treating gravel roads in our country that is very satisfactory. We put on more gravel and add oil. We mix it up every day for a week or more, then roll it, and we get a road that holds.

Mr. MONTET. We find in Louisiana that a gravel road will stand up all right where traffic does not exceed 500 vehicles a day. When it goes beyond that it is no longer economical to try to maintain a gravel road.

Mr. LEAVITT. That depends somewhat on the character of the vehicle.

Mr. COLTON. Doctor, coming back to the subject, if Mr. Montet is through, I wanted to ask you what set-up you have in your organization now to take care of cases where the payments become delinquent or a farmer abandons his place. What do you do in cases of that kind?

Doctor MEAD. Where he abandons his place we can not do anything. We have no authority to buy the land, and we have to let it stay idle.

Mr. COLTON. So that you really can not foreclose a lien?

Doctor MEAD. No. The only thing we can do is to shut off the water; and after the man is gone that does not bother him. That is what he wants us to do.

Mr. COLTON. It seems to me authority should be given to you to take care of cases of that kind.

Doctor MEAD. Yes; we need it. If I might travel on—the itinerary I would lay out for you gentlemen contemplates going over to the coast, stopping at the Sun River project where we have 40,000 acres. The Sun River project is all settled.

The CHAIRMAN. That is in Montana.

Doctor MEAD. Yes. We built a magnificent dam there, and there is plenty of water, and we can have an irrigated agriculture there instead of a modified dry-land agriculture that they have had in the past. From there we go over into Washington. Ever since the beginning of the reclamation policy we have been engaged in the utilization of the waters of the Yakima River, building one reservoir after another, and one division after another until we have come now to considering the last unit. That last unit is costly—probably \$240 an acre; and the one we are building is \$160 an acre. It would be folly to consider those prices if it were not land of exceptional value. The average value of the crops on the Tieton division was \$190. That is the average for every acre in it. On the largest section the value was over \$100 an acre, and in the lower part it was \$198 an acre.

But if we are going to do this thing and do it sensibly, we must face the situation that we faced on the Orchard Mesa—there must be a graduation of those payments because on parts of that land water has two or three times the value it has on other parts, and if we impose a flat charge all over the entire project such a policy would inevitably let the man owning valuable land have water too cheap or charge the poorer land more than it could pay.

Mr. SWING. Under the provisions of the reclamation law there is no question that we can not apportion the charges upon an assessed valuation basis. It must be assessed at a flat rate under existing law.

Doctor MEAD. No; that is a matter of regulation; but we do not have the authority we would like to have; and in this connection it is the State law which governs.

Mr. SWING. I am talking of your reclamation projects after you have constructed your works. Is it possible for you to collect the Government charges based upon an appraised valuation of the land?

Doctor MEAD. Mr. Dent, you can answer that.

Mr. DENT. I think you can not do that in Washington, Mr. Swing, because they do not have the ad valorem basis of taxation. It has got to be on the benefit basis.

Mr. SWING. You misunderstand me. I am talking about the reclamation service, a Federal agency, getting back the money which it has expended. Is it possible for you, under the law, to apportion the charges of a project on an appraised valuation of the land?

Mr. DENT. Ordinarily, the contracts that we now make do not attempt to apportion charges among the landowners, but we permit that to be done, and it can be done.

Mr. SWING. I want to know what your interpretation of the law is, not what your practice is.

Mr. DENT. The Federal law does not require it, but it can be done that way.

Mr. SWING. It can be done either way.

Mr. DENT. Yes.

Mr. SWING. But it has never been done in any other way except upon a flat rate acre basis.

Mr. DENT. That has been the custom heretofore.

Mr. SWING. I suppose the difficulty on the average project is that while before it has been brought into cultivation, it is possible to make a theoretical valuation based upon soil analysis, it is not possible to make an actual, accurate appraisal until after it has been put into cultivation and its possibilities proven.

Mr. DENT. That is the difficulty. Unless you have the ad valorem basis, as they have in California, the taxes vary according to conditions; and that, we believe, is the proper basis for all of the States, but, unfortunately, in some of the States we can not do that because of State constitutions and State laws.

Mr. SWING. Once you have gotten your settlers, and have turned your project over to them and taken the contract of the district in return for your charges against the land, then, I assume that in practically every one of these projects it goes upon an assessed valuation system; but until you have done that you have used nothing but a flat basis.

Mr. DENT. Yes, sir. In some States the district are given the option, either to adopt the benefit basis, the flat basis, or the ad valorem basis. That is true in Texas, and in one or two other States where the State constitution will permit them to do that, and they can vary the estimates as the conditions justify.

Mr. ESICK. What have the State laws to do with these projects if they are purely Federal?

Mr. DENT. We operate through the medium of irrigation districts, and they are organized and operated under the State laws.

Mr. ESICK. Are they in the nature of domestic corporations?

Mr. DENT. They are quasi-municipal corporations.

Mr. ESICK. And they, of course, are controlled by State laws.

Mr. DENT. Yes. The actual operations are governed solely by State laws. Of course, they have got to be in harmony with the Federal policy.

Mr. SWING. It can not operate as a district until you have a certain number of settlers; at least enough to take it over and run it.

For the first few years it has got to be run by the Government as a reclamation project.

Mr. ESICK. The general rule is that wherever State and Federal law conflicts the State law gives way to the Federal law.

The CHAIRMAN. Will you proceed with your next point, Doctor?

Doctor MEAD. We have certain projects that have been unfortunate. The Umatilla project in Oregon is one. That has been a failure due entirely to the soil. It will not produce crops that pay for irrigation. They ask that the entire charges be remitted. King Hill, in Idaho, is in exactly the same condition.

Both projects have a sandy soil. The water leaches through and washes out whatever inherent fertility it has, so that production has been falling off year by year until we do not believe that they can bear the construction charges or that they ought to be asked to pay them.

However, we do not want legislation simply for those two projects. We believe that the necessary legislation should cover the whole field of reclamation and the things reclamation needs to bring it into complete harmony with the economic requirements of to-day. So far as these two projects are concerned, no effort will be made to collect construction charges from them this year. They can wait until we deal with the whole question.

Mr. SWING. How are you getting your maintenance and operation charges?

Doctor MEAD. The water users have taken over these projects and are operating them.

Mr. SWING. They are operating them?

Doctor MEAD. Yes.

The CHAIRMAN. What will eventually be the fate of these farmers if they are relieved of the Government construction charges? Will they be able to go ahead and take care of themselves on the Umatilla project?

Doctor MEAD. I do not want to express an opinion because I do not feel sure of it.

The CHAIRMAN. Your idea is that if the Government could step out of the Umatilla project and give them the whole project, yet the farmers could not make a living?

Doctor MEAD. Yes.

Mr. SWING. Are farms there actually being abandoned in the poorer parts of the project?

Doctor MEAD. Yes.

Mr. SWING. And the land is going back to the desert?

Doctor MEAD. And those men are just as good farmers as there are in the United States. They made a heroic struggle to hold on, but are all discouraged at the outlook.

Mr. BUTLER. No project was ever settled by a better class of settlers than those who went there in the beginning.

Doctor MEAD. Umatilla ought never to have been built; that is all there is to it; and it shows how necessary it is to study everything that affects the return of the money when a policy is adopted.

Mr. ALLGOOD. What crops are produced on the Umatilla project?

Doctor MEAD. Alfalfa and grain are the two main crops.

Mr. LANKFORD. How far is that from Umatilla city?

Mr. BUTLER. It is just a few miles, Mr. Lankford; and it is west of Pendleton, if you recall where that is, right on the railroad. Transportation facilities there are good; everything is all right except when that project was selected they failed to select one of the better sections of one of the greatest agricultural counties in the Northwest.

Mr. LANKFORD. Is it near Umatilla Rapids?

Mr. BUTLER. Yes; it is near the rapids.

Mr. LANKFORD. How many acres are involved in this project?

Doctor MEAD. About 18,000 irrigable acres.

The CHAIRMAN. And about one-third of it being cultivated?

Doctor MEAD. Eleven thousand acres were cropped last year.

Mr. LEAVITT. What is the value of the crops?

Doctor MEAD. In 1929 the value of the crops was \$286,000—\$26 an acre.

Mr. ARENTZ. That is an average of \$26 an acre?

Doctor MEAD. Yes; for the two division combined. The per acre value on the east division was \$23.88 and on the west division, \$30.41.

I wish to bring to your attention one other fundamental matter. In the West are a great many irrigation districts that have not been fully completed, where the people are stranded to-day. They come to us asking that we take the projects over and complete them. In some cases I am quite certain that to do that would bring about more beneficial results than to irrigate unpeopled, unimproved land. It all depends on being careful not to take over a project that can not be rescued. That is the main difficulty.

Mr. LEAVITT. Like King Hill!

Doctor MEAD. We are confronted with this situation: We will, this year, complete some parts of the 10-year program. From now on we will be getting toward the end of that program and we must consider what should follow.

The CHAIRMAN. Your idea, as I gather from your remarks, is that it is better to rehabilitate some of these struggling projects than it is to start new ones.

Doctor MEAD. Yes.

Mr. LEAVITT. But not take in just any kind of a project. In the Bitterroot Valley the people have been very successful in using the land, but are now in difficulties due to conditions that could not easily be met. That whole community could be saved, which would be better than gambling by starting a new community where the question would be unanswered for a good many years.

Mr. SWING. Then, too, there is the case of Palo Verde Valley where a community already exists, but which, because of the ravages of the river and the resulting financial burdens, finds itself in such shape that they can not carry the burden.

The CHAIRMAN. You have told us of some of the failures. We have some new members on this committee. I think for their benefit, you should take about five minutes to tell them something about the successful projects.

Doctor MEAD. I shall be glad to amplify what I said earlier in this hearing. I want to say to those new members that we would not urge dealing with these conditions if we did not believe two things: One,

that the continuance of Federal reclamation is absolutely essential to western development and the prosperity of the West. I want to say, further, that there has never been any investment by this Government that has brought a larger return to the Nation as a whole, independent of the farmers, than our investment in Federal reclamation. In the creation of values and of homes, it has influenced the development of many other enterprises—mines, and mills, and railways.

We have been talking about the difficulties of projects, because that is what we go to see; but I want to point out that one of our projects that cost the Government \$12,000,000 has made every payment but one to the Government that was required under its contract, and had a crop value year before last of \$26,000,000, over twice the entire cost of the project to the Federal Government. Last year the crop value was \$25,423,000.

Mr. COLTON. Where is that, Doctor?

Doctor MEAD. That is the Salt River project.

We have on these projects a much higher average-acre return than is received from agriculture outside the projects. I think we can claim that we have better cultivation and conditions also. It leads to very contented and happy homes. The return for 1928 on the Rio Grande project was \$12,733,000, and it cost around \$15,000,000.

The CHAIRMAN. In one year.

Doctor MEAD. That was the crop return in just one year.

The CHAIRMAN. Is not the same thing true about the Minidoka project in Idaho?

Doctor MEAD. Yes.

The CHAIRMAN. And is that not also true of the Boise project?

Doctor MEAD. Yes.

The CHAIRMAN. The failures, then, are of the small, insignificant projects. The successes are in the large projects, where they have fifty, seventy-five, or a hundred thousand acres.

Doctor MEAD. The failures are due to certain conditions that we did not anticipate in the reclamation act, and that we could have overcome at the time. They need never have been failures except where soil conditions are unsuited to agriculture.

The CHAIRMAN. Had soil surveys been made then such as are made now you would never have built them.

Doctor MEAD. No; we would not have built them.

The CHAIRMAN. No new project is undertaken until it is first investigated with reference to soil conditions and the character of the crops that can be raised, and the proximity to markets, and such things.

Mr. ARENTZ. I notice that you did not include the Newlands project in your economic survey. Is that going along all right?

Doctor MEAD. Yes; they are going along all right. We have had no request to do anything there.

Mr. COLTON. I see also you have been furnishing supplementary water.

Doctor MEAD. That refers to projects which have an inadequate water supply, and we furnish a supplemental supply under the provisions of the Warren Act. Since the passage of the Warren Act the bureau has entered into 77 contracts for the sale of supplemental

water for irrigation. These contracts have a total value of \$7,514,521 and involve the purchase of 1,600,000 acre-feet of water. The irrigated area of these lands served in whole or in part with water from the Government works amounted last year to 1,235,020 acres, of which 1,192,030 acres were cropped, producing crops valued at \$62,500,000. Repayments due under these contracts to June 30, 1929, amounted to \$5,333,519, of which all but \$72,190, or about 1.3 per cent of the amount due has been paid.

The CHAIRMAN. It is planned to extend in the hearings the economic report; and when this hearing is printed it will contain all of this data to which reference has been made.

As I understand it, Doctor, your survey is for the projects that are in financial distress.

Doctor MEAD. Yes.

The CHAIRMAN. It does not take up the successful projects.

Doctor MEAD. No; only those where there are economic questions.

Mr. LEAVITT. Those where there are problems that need to be taken up and settled, to make their success complete.

Doctor MEAD. What we want to do is to determine what changes and modifications should be made in the reclamation act that would make it more successful, both to the individual who finds a home under it, and to the Government itself.

I wish also to submit as an appendix to my remarks the original reports of the investigators who made the economic survey last summer, on which is based the report of the special advisers which we have been discussing.

The CHAIRMAN. We appreciate your coming before us, Doctor, and giving us this valuable information; and we will take under consideration your suggestions that the committee or a subcommittee visit the various projects.

(Thereupon, at 12 o'clock noon the committee adjourned.)

---

#### ECONOMIC SURVEY OF CERTAIN FEDERAL AND PRIVATE IRRIGATION PROJECTS, 1929

[Prepared by: George C. Kreutzer, director of reclamation economics, chairman; Dr. Alvin Johnson, associate editor, Encyclopedia of Social Sciences, New York; Dr. Charles A. Lory, president, Colorado Agricultural College; Dean Anson Marston, school of engineering, Iowa State College; Prof. Frank Adams, college of agriculture, University of California; A. C. Cooley, senior agriculturist of the Department of Agriculture, in charge of demonstrations on the reclamation projects; John W. Haw, director of agricultural development, Northern Pacific Railway; Hugh A. Brown, assistant director of reclamation economics, secretary.]

This report is based on field investigations made by Dr. Alvin Johnson, associate editor, Encyclopedia of Social Sciences; Prof. Frank Adams, college of agriculture, University of California; A. C. Cooley, senior agriculturist, Department of Agriculture; George O. Sanford, superintendent, Sun River project; H. H. Johnson, superintendent, Milk River project; L. H. Mitchell, superintendent, Shoshone project; F. C. Youngblutt, superintendent, Belle Fourche project; B. E. Stoutemyer, district counsel; William J. Burke, district counsel; B. E. Hayden, reclamation economist; W. W. Johnston, associate reclamation economist; Prof. W. L. Powers, chief of soils, Oregon State College; Rhea Luper, State engineer of Oregon; L. R. Breithaupt, extension economist, Oregon State College; H. K. Dean, superintendent experiment station, Hermiston, Oreg.; G. R. Hyslop, agronomist, Oregon State College experiment station; R. J. Ott, E. L. Jackson, F. L. Jewett, T. W. Botkin, and

N. Madden, representing Hermiston irrigation district, Umatilla project; William F. B. Chase, secretary, Horsefly irrigation district; A. C. Houghton, manager, west extension irrigation district, Umatilla project; Ed. F. Williams, George W. Scott, and L. A. Hauser, representing the Palo Verde irrigation district; Miss Dorothy Lampen, special investigator of project women and home conditions.

## PART I—PREFACE

### CHARACTER OF FEDERAL RECLAMATION POLICY

When the reclamation act was passed 27 years ago the West had a frontier. The act was framed to meet an agriculture and a rural life that were primitive in character. People moved to the irrigated farms in slow-traveling covered wagons over unformed dirt roads or trails. It was believed that this act would deal mainly with land that would be free, that the cost of providing water would be low, and that self-denial and industry would be the main requirements of success.

In the years that have passed the conditions to which this act must conform have undergone a revolutionary change. The population of the States to which it applies has increased from 11,188,000 to 23,456,000. The cost of providing water and of preparing land for irrigation is far greater than originally anticipated. Free land has been found to be a delusive beacon of hope. The primitive agriculture once considered the basis of this development will no longer answer. Only by intensive culture and properly improved and equipped farms can the costs of reclamation be met.

It would be a miracle if an act framed to meet the requirements of a quarter of a century ago could meet the requirements of to-day. Originally, it was believed that if water was provided, the settler, without capital or financial aid or direction, could establish a home and meet the Government's payments. Now we know that this can not be done. The farmer must have considerable capital or access to credit. If he is not a skilled cultivator means must be provided for helping him to become one. Many types of soil that will grow wheat or native hay will not grow sugar beets or the products most profitable under irrigation. The suitability of the soil has therefore become a far more important factor than it was at the outset or than is fully realized to-day.

In other words, the problems of reclamation have shifted from engineering to those of economics and business. The evolution of reclamation law has not kept pace with these changing conditions or with our better understanding of what is required. The investigations embodied in this report grew out of abundant evidence that the reclamation act needs to be revised. The strongest testimony for this is to be found in those areas where the act has not worked well and where its weaknesses are most apparent. Nothing can be gained from a study of those projects where the act has succeeded, and they embrace 84 per cent of the area included in reclamation projects. This report deals with the other 16 per cent where changes of some kind are needed, because the investigation and discussion deals only with projects and localities where difficulties have been encountered. The report does not assume to present a complete view of Federal reclamation. Unless some reference is made to the achievements of reclamation, those not familiar with the West might think that all Federal reclamation is in distress. It seems necessary, therefore, in order to prevent such misconception, that a brief summary be given of the wonderful achievements under this act in that section of the country where its operations were necessary to securing a sound and balanced development of the region's latent resources.

### ACHIEVEMENTS OF FEDERAL RECLAMATION

There is no way of measuring accurately the full contributions these enterprises have made to the business and social life of the States and communities in which they are located, and to the national wealth, but the following facts are pertinent: They have greatly aided commerce as the residents of the projects are buyers and sellers of a vast amount of goods and products. The projects have brought about improvement and increase in both highway and rail transportation. They have provided huge revenue tonnage for transcontinental carriers through regions of otherwise sparse traffic, and thus to an appreciable extent have lowered the rate levels on other commodities moving



over their entire systems. They have contributed to education and to local government by the payment of taxes. They have made it possible to utilize fully adjacent ranges and to stabilize the livestock industry and dry-land agriculture of the West. They are the main source of food supply for many mining and lumbering camps.

In 1928 the cultivated area receiving water from Government works was 2,681,270 acres, producing crops value at \$143,573,070. From the time that water was first available in 1906 for crop production, the cumulative value of crops grown on land furnished water from the works of the bureau has amounted to \$1,481,087,800.

The total value of livestock in 1928 on about half the area, for which statistics are available, was \$27,700,000 and that of farming equipment \$14,363,000, or a total stock and equipment value of \$42,063,000.

Serving the projects and adjacent areas are 17 beet-sugar factories, which in 1928 produced more than 500,000,000 pounds of sugar and paid \$12,800,000 for beets, about \$5,500,000 having been paid to the water users on the Federal projects.

Shipments to stations on 17 of the 24 operating projects in 1928 numbered 95,496 carloads valued at \$119,619,000, and shipments from stations on these projects totaled 112,608 carloads valued at \$158,295,000.

In 1928 the 40,788 irrigated farms on the Federal projects for which statistics are available had a population of 153,663, and the 212 project cities and towns an additional population of 451,811. There are on these projects 687 schools, 680 churches, and 136 banks with deposits of \$147,732,900 and 248,373 project and nonproject depositors.

It is estimated that the increased value of lands and other properties on farms and in towns within the enterprises watered from the works of the bureau amounts to at least \$500,000,000.

The total repayments to the Government by the water users on construction and on operation and maintenance during the fiscal year 1929 were \$6,308,314, of which approximately \$4,388,000 was for construction. The construction repayments in 1928 were \$1,108,000 more than in 1927, and in 1929 were \$1,142,000 more than in 1928, or an increase of \$2,250,000 in two years.

There is general agreement that the engineering operations of the bureau have been well conceived and capably carried out. They have resulted in the construction of 118 storage and diversion dams, 16,557 miles of canals, ditches, and drains, 148,462 canal structures, 11,631 bridges, 14,042 culverts, 4,811 flumes, 1,203 miles of roads, 3,350 miles of telephone line, and 2,056 miles of transmission line. Excavation of earth, rock, and indurated material amounts to 276,822,500 cubic yards.

The Government committed itself from the outset to financing construction of Federal projects on an interest-free basis during the period allotted to settlers for repayment. Such waiver of interest represented a just and reasonable compensation for support of large development enterprises which are deemed advantageous to the general public. The amount of such governmental aid to each individual project, of course, varies with and is measured by the length of time granted for the repayment of construction charges. Whether such governmental aid was too generous or not generous enough can be determined only by a study of its operation on the various projects. The incentive to such study on prosperous projects is small. No one complains if the terms of payment can be made without excessive hardship. It is only where development lags or where contract payments are not met that the adequacy of the governmental aid in the form of interest waiver becomes a vital issue.

By the strict canons of private enterprise each reclamation project, and the group of reclamation projects as a whole would need to show a net return in excess of all costs, including interest on construction. A sound public policy does indeed recognize the importance of the relation between net return and cost, and will hesitate to enter upon an enterprise where the deficit is excessive. But it also takes into account other items, such as the social value of a settled agricultural community to the population of the adjacent grazing or mineral lands, the contribution of the irrigated lands to the maintenance of schools, churches, roads, railways. When these and other general benefits are properly evaluated, the reclamation policy of the Federal Government has been fully justified by its results.

## SCOPE OF REPORT

The advisers who were appointed to prepare the report of this investigation decided early in their deliberations to confine themselves in the main to matters relating to present Federal reclamation policy, and to the steps which will improve conditions on existing projects, and give better opportunity for success in the future. They have therefore refrained from considering proposals involving radical changes in the Federal reclamation program, and have touched only very generally on such national aspects of reclamation as those relating to agricultural surpluses and the bringing of new areas into agricultural production. The advisers have followed this course not only because they considered themselves specifically charged with reporting on present policy, but also because they are convinced that such changes in present policy as are desirable can be most easily and more surely accomplished by gradual evolution from what has already been established.

In addition to considering general reclamation matters as outlined above, the advisers have carefully reviewed the requests made by the projects or parts of projects which were investigated and have sought to pass on these requests in the light of what seemed to be the best interests of the projects and of the general reclamation program as well. In numerous instances a measure of Government aid was asked which clearly was not justified by the returns reasonably to be expected. Such requests obviously could not be approved. In other cases conditions complained of clearly existed, but the responsibility for their correction or amelioration just as clearly lies with the local and State agencies, or with the people on the projects, rather than with the United States. On the other hand, the investigation disclosed numerous instances justifying further Federal assistance, ranging from extension of construction payments to cancellation of the entire debt owing to the Government, and as to these the advisers have not hesitated to make favorable recommendations. Perhaps the requests most difficult to deal with were those for additional credit facilities in the establishment of farms. These the advisers have sought to cover by a statement of desirable general credit policy.

The outstanding need for credit and the delay in providing means for meeting it are explained in part by the fact that Federal reclamation has from the first been an experiment. It has been made so by its character and by the revolutionary changes in agriculture and living conditions in the region where it operated. Each project has its own peculiarities of construction, water storage, and distribution. Each project has also its own peculiarities of climate, of soil, of surrounding lands, of transportation, and of marketing. On these projects settlers from different States, many without experience in irrigation, some without farming experience, strive to make a living. They must learn a new system of farming, how to prepare the land, how and when to irrigate, how to conserve their water supply. They must learn what crops they can grow, which are best adapted and most profitable, what is the best system of rotation.

They find themselves in dire need of everything except the canal. All the rest has to be provided by them. The land has to be cleared and leveled. Farm buildings have to be erected. More machinery, more power, and more labor have to be provided. Credit facilities sufficient for farming under humid or dry farming conditions do not begin to meet the needs of the man confronted with conditions where there is no immediate income and where everything that has to be done has to be paid for at once. Markets must be developed, the necessary highway and railway transportation provided. Increased production often is dependent on the building of a sugar factory or plants for packing, processing, and similar enterprises.

The farmers on the projects must learn to cooperate in the use of water, in the growing of profitable crops, in obtaining new outlets for their products, and in providing schools, churches, and general community building.

Local leadership must develop and local morale and community pride must be built up. This takes the efforts and the time of a generation under the most favorable conditions.

The object of Federal reclamation was not to supplant private projects but to undertake projects involving the construction of extensive works beyond the financial and organizing capacity of private enterprise. Naturally the engineering aspect received chief emphasis at the outset. Providing water for the land was conceived to be all important; settlement and community

building were taken for granted. Relatively to the average cooperative or corporate project, many of the Federal projects involved a large total outlay and high acreage costs, but not beyond the capacity of a fully developed agriculture to pay. Insufficient allowance was made, however, for the time involved in establishing a fully developed agriculture, and the early contracts for the repayment of construction charges were in some cases unduly burdensome and operated to weaken the morale of the settler.

Other serious faults arising from inexperience were the failure to recognize that project costs could not be calculated instantaneously in advance and that for each particular project the cost should be set at a figure which might afford a reserve against projects that proved unduly expensive. The availability of such a reserve would have obliterated much discontent and discouragement on the part of settlers who found costs assessed upon them beyond their expectations.

In most of the older projects whatever difficulties arose on account of faults in reclamation policy have disappeared through gradual adjustments. In some projects, however, the settlers are to-day beset with difficulties with which they can not cope successfully either individually or collectively. This is particularly the case with projects launched in the period just following the war, a period of high construction costs and low agricultural prices. The Bureau of Reclamation desires in these and all other cases to find out what is needed and then cooperate in sound constructive action.

#### ECONOMIC SURVEY RECOMMENDED

To bring about such action the Commissioner of Reclamation, in a letter to the Secretary of the Interior of April 8, 1929, recommended that an investigation be made of the condition of a number of projects which for one reason or another have been slow in development and have encountered difficulties not characteristic of reclamation agriculture as a whole.

"On a majority of the projects" he stated in his letter to the Secretary, "farmers are prosperous, and the payments required under the contracts are being made, but there are other projects where development has been slow, where settlers are struggling in all stages of discouragement and hardship, and where delinquency in payments has been an inevitable result." He regarded the proposed investigation as desirable "because"—quoting further from his letter—"on backward projects a large percentage of the farms are either not irrigated or are poorly cultivated, with such low returns as to create grave doubt as to whether the contract obligation to the Government can be met."

A large part of the field work in the investigation was done by members of the staff of the Bureau of Reclamation, the entire field investigation being conducted under the direction of George C. Kreutzer, director of reclamation economics, assisted by Dr. H. A. Brown, assistant director. With a view to bringing to the study an outside and detached view, there were added to the investigators Dr. Alvin Johnson, associate editor *Encyclopedia of Social Sciences*, New York; Mr. A. C. Cooley, senior agriculturist of the Department of Agriculture, in charge of demonstrations on the reclamation projects; and Prof. Frank Adams, of the college of agriculture of the University of California. Finally, still further to insure a broad consideration of the problems studied, the group which was asked to review the reports of the different field investigators, was augmented by Dean Anson Marston, of the school of engineering, Iowa State College, president of the American Society of Civil Engineers, and president of the Association of Land Grant Colleges and Universities; Dr. Charles A. Lory, president of the Colorado Agricultural College; and J. W. Haw, director of Agricultural development of the Northern Pacific Railway.

*The conference at Billings, Mont.*—Invitations were sent to a large number of individuals to attend a conference at Billings, Mont., on June 18 and 19, 1929, to discuss the plan and scope of the proposed survey before the investigators proceeded to their field assignments. The conference took the form of a general discussion of the items upon which the bureau desired conclusions and recommendations for each project to be investigated; the items in the various questionnaires and how the information desired might best be obtained; and the form and length of the reports to be prepared by the investigators.

*Assignment of investigators.*—Investigators were assigned to the investigation of specified projects or divisions, as follows:

	Investigated by—
Northport division of the North Platte project, Nebraska-Wyoming, and Riverton project, Wyoming	Dr. Alvin Johnson.
Willwood division of the Shoshone project, Wyoming	B. E. Hayden.
Lower Yellowstone project, Montana-North Dakota, and Bitter Root project, Montana	G. O. Sanford.
Greenfields division of the Sun River project, Montana	H. H. Johnson.
Milk River project, Montana	L. H. Mitchell.
Belle Fourche project, South Dakota	F. C. Youngblutt and Wm. J. Burke.
Gem irrigation district, Emmett irrigation district, and King Hill project, Idaho	W. W. Johnston and B. E. Stoutemyer.
Orchard Mesa division of the Grand Valley project, Colorado, and Shasta View and Main districts of the Klamath project, Oregon-California	Prof. Frank Adams.
Owyhee and Duck Valley projects, Oregon	A. C. Cooley, Rhea Luper, Prof. W. L. Powers and L. R. Breithaupt.
Umatilla project, Oregon	H. K. Dean, L. R. Breithaupt, G. R. Hyslop, Prof. W. L. Powers, H. J. Ott, E. L. Jackson, F. L. Jewett, T. W. Botkin, New Madden, and A. C. Houghton.
Project women and home conditions	Miss Dorothy Lampen.

These investigators were assisted by representatives of the agricultural colleges in the States in which the projects investigated were located, by State officials, and by representatives of the Federal land banks.

*Information from other projects.*—After the assignment of investigators several requests were received by the bureau for investigations of other projects. It was not feasible to assign bureau investigators to this work, but such projects were advised to forward the results of such investigations as they themselves might care to make, the bureau supplying copies of the instructions and questionnaires in the interest of uniformity. Such reports were received from the following projects:

	Investigated by—
Palo Verde irrigation district, California	Ed. F. Williams, George W. Scott, and L. A. Hauser.
Stanfield irrigation district, Oregon	H. K. Dean, L. R. Breithaupt, G. R. Hyslop, and Prof. W. L. Powers.
Westland irrigation district, Oregon	H. K. Dean, L. R. Breithaupt, G. R. Hyslop, and Prof. W. L. Powers.
Horsefly irrigation district, Oregon	William F. B. Chase.

## PART II. NATURE OF THE REQUESTS THAT HAVE BEEN SUBMITTED

In any movement as broad as Federal reclamation, new conditions are certain to arise which demand review and in some cases require readjustment. It was, in fact, just such a situation which brought about the economic investigation of projects with which this report deals. All of the difficulties that may arise can not always be foreseen at the time a project is approved, and the policy of the Bureau of Reclamation has been to keep itself informed as to conditions on each Federal project, and to deal with each situation according to its merits.

Requests have been submitted to the Government and considered by the investigators and the advisers which cover a rather wide range. In some cases a revision of the existing repayment contract is desired in order to reduce

the annual charges which those on the project are called upon to pay. Some have asked that the period of repayment be extended from 20 to 40 years, or some other period than that now provided for. Several have urged that repayment of the Government construction charges be temporarily suspended and that water be delivered on a rental basis. In a few instances the adjustment or suspension of delinquencies to the Government is involved. Still other requests call for additional construction, for a reduction in the total obligations to the Government, or for assumption by the Government of indebtedness to bondholders and other private creditors. In one instance the Government is asked to assume the cost of flood control, including reimbursement to the project of funds already spent for that purpose. A second district, to which no Federal aid has yet been given, requests that it be taken over as a Federal project and that the Government purchase its outstanding bonds and warrants and reconstruct its irrigation system.

It has seemed to the advisers that the requests made can be divided into three more or less distinct classes, namely: (1) Revision of existing repayment contracts, with or without additional Government expenditures; (2) extension of existing projects, these in some cases involving entirely new divisions of the projects; and (3) Government assistance to private projects in financial difficulties. However, because some of the projects investigated, or on which reports have been submitted by the projects themselves, have made requests that fall within more than one of the above classes, it has not been found practicable to consider the three classes entirely separate. Each project is therefore taken up individually and all of its requests considered together.

#### GENERAL PRINCIPLES WHICH HAVE GOVERNED THE RECOMMENDATIONS OF THE ADVISERS

Numerous petitions for revision of repayment contracts have heretofore been considered and acted upon by the Bureau of Reclamation. They have invariably called for extension of the time of repayment to the Government, usually from 20 to 40 years. Attempts have been made by the bureau to establish a general policy of dealing with these requests, first, in accordance with the needs of the particular project under consideration; and, second, with a view to creating a sentiment favorable to the integrity of Government contracts. The advisers have found that the bureau has not always been successful in its efforts to adhere to such a general policy. In the opinion of the advisers, however, adherence to such a general policy is imperative if Federal reclamation is to continue on a basis that is fair to all. The policy which the advisers have sought to keep in mind in considering the projects on which reports have been submitted follows:

1. That no extension of the period of repayment should be made by the Government which does not give reasonable assurance that the conditions causing the unsatisfactory situation can thereby be eliminated or measurably mitigated.
2. That extension of repayment to one project is in itself no ground for granting a similar extension to another.
3. That no extension should be allowed where the result would merely be of benefit to private creditors.
4. That extensions should be granted if really needed to enable the actual farmers on a project to complete the development of their farms and thus establish the earning power required for successful settlement.
5. That an extension should be granted if it will measurably increase the prospect of the ultimate return of the Government's investment.

When it comes to passing on enlargement of the projects to which the Government has already granted aid in some form, it is necessary to consider not only the economic welfare of those living on the project and the ultimate economic soundness of the enterprise, but also the general balance in the Federal reclamation program. It has been generally conceded that the primary task in Federal reclamation during the present decade is to complete and make successful the existing projects, and to put to beneficial use the water supply that has been made available. It is felt by the advisers that the enlargement of existing projects can only be justified if essential to the success of such projects or to meet some special need. The advisers also feel that any such proposed development should not be approved if materially out of line with the 10-year con-

struction program adopted by the Bureau of Reclamation, with the approval of the Secretary of the Interior, several years ago.

This 10-year program calls for the expenditure after June 30, 1927, and mainly by 1937 of the accretions to the reclamation fund, which amount to approximately \$9,000,000 annually. Some additional items have been inserted in that program by Congress, there have been some revisions in amounts, and some important items which were scheduled for action prior to the present have not yet been expended. In general, the 10-year program has been adhered to and has stabilized expenditures and should not be disrupted by projects not included in such program. There are many demands for Federal reclamation which are not covered by the program, and priority status should not be granted to extensions and enlargements of existing private projects.

The sentiment which has been growing in the past few years in some parts of the West in favor of the Federal Government taking over private projects that are in financial difficulties has not been overlooked by the advisers. Two such projects have been before them. The general principles which the advisers believe should govern action by the Government in connection with these projects are set forth later in this report.

#### SPECIFIC ACTION DESIRED BY THE PROJECTS AND RECOMMENDATIONS OF THE ADVISERS

*Federal projects.*—Included in the economic survey are four projects constructed in whole or in part by the Federal Government, where settlement and development have been unduly prolonged and where, in some cases, repayments have as a consequence fallen behind. Specific requests were made by these projects, which included extension of time of repayment, the writing off of the total indebtedness to the Government, a moratorium in payments, and the establishment of a credit agency to furnish funds for development. A discussion of these Federal projects, from which such requests were received, follows:

*Belle Fourche irrigation district, South Dakota.*—This district desires to form a credit corporation to loan money to erect buildings and to make other improvements to encourage settlement and development of project lands. It suggests that the United States contribute half of the fund for the capital structure of this corporation and that local interests contribute the other half.

The Government expended to June 30, 1927, \$3,565,000 for the construction of the irrigation system and has agreed to expend \$1,000,000 additional for drainage to relieve seeped lands, \$150,000 for the replacement of certain temporary structures and \$30,000 for economic investigation and settlement work. When this program and Willow Creek extension are completed the Government will have invested in the project about \$5,000,000, the construction charge varying from \$55 to \$75 an acre. The funding of delinquent operation and maintenance charges and interest and penalties on delinquent construction and operation and maintenance charges increased the total obligation of the district to \$5,432,258.07, of which \$552,811.91 has been repaid. The district collects and pays in advance to the Government the full operating costs of the project and has agreed to resume construction payments in 1930.

The project is favored with productive soil and a climate which permits the growing of a large number of general farm crops including alfalfa, sweet clover, small grains, corn, cucumbers, and sugar beets. Notwithstanding all these advantages only 35,910 acres were irrigated in 1928 out of an irrigable area of 74,500 acres.

The project includes a large area of heavy soil locally known as "gumbo." It is expensive to work and hard to cultivate. It is therefore not attractive to beginners, although when subdued and properly cultivated it produces satisfactory yields of general farm crops. Since 1924 a continuous effort has been made to settle the unoccupied farms, increase the areas farmed intensively and bring new industries to the project. This has resulted in building a sugar factory at Belle Fourche, extending branch lines of the Chicago & North Western Railway to project lands and securing settlers for about 20 per cent of the farms listed for sale.

Most of the farms taken by settlers were equipped with livable houses and fair outbuildings. After these were disposed of, settlement practically stopped. Landowners were asked to erect buildings and partially improve their farms ready for settlement, but only a few of them were able or willing to do this. There is no agency at present that can advance funds on satisfactory terms for this purpose.

The problem of the bureau is to secure the repayment of its investment. This can be done only by the complete settlement and cultivation of the project land under conditions which will enable the settlers to improve their farms and prosper. In addition to refractory soil on a portion of the project, inadequate credit is the main obstacle. It seems to the advisers that the Government should consider ways and means of providing satisfactory credit which will assure continuous development of the project and prompt payment of construction charges. Probably not more than \$200,000 of capital is needed for this purpose, which would be sufficient to improve 150 or more farms. The settlement and cultivation of this number in addition to the farm development now on the project would, it is believed, leave no question as to the future success of the project.

**Recommendation.**—The advisers are sympathetic to the request of the district that the Government aid in improving credit conditions, but in the absence of general legislation authorizing this form of aid, there is no way by which it can be given. The credit needs in this district are similar to those on many of the other Federal projects and they should be considered as part of the general credit problem. The credit policy which the advisers believe should be adopted on the Federal reclamation projects is discussed elsewhere in this report and is believed to be applicable also to this project.

**Milk River project, Chinook division, Montana.**—This division requests that repayment contracts be entered into between the United States and the five irrigation districts comprising it to provide for the repayment of construction cost in 40 years. They also request an accounting of the construction cost. They claim this cost is \$12.25 an acre instead of \$15 an acre.

The division is divided into the Fort Belknap, Alfalfa Valley, Zurich, Harlem, and Paradise irrigation districts. Diversion dams, pumping plants, and the irrigation systems within the districts were constructed and financed by the districts, but Sherburn Lakes Reservoir and St. Mary Canal were constructed by the United States.

Expenditures for construction by the United States for the Chinook division amount to approximately \$22 an acre. This cost was reduced to \$12.25 an acre by the adjustment act. Additional construction work has increased this cost to approximately \$15 an acre.

The following shows the bonded and warrant indebtedness of each district and the annual assessments per acre for irrigation:

Name	Bond and warrant indebtedness	Annual irrigation assessments per acre
Zurich .....	\$303,310.00	\$3.85
Paradise .....	114,065.00	2.80
Fort Belknap .....	83,708.00	2.08
Alfalfa Valley .....		2.00
Harlem .....	14,834.00	2.50

State and county taxes average from 50 cents to 85 cents an acre.

The main problem on the division is the large area of poor land included in the districts. The bureau is making a land classification at present to determine the extent of temporarily and permanently unproductive land. The advisers believe that the construction charges should be suspended or written off against these poor lands.

If the Government were to approve the request of this division for extension of repayment terms, it would result in reducing the annual construction payments to the United States from 75 cents to 37½ cents an acre a year. This would afford no material relief to the districts as the Government charges are only a small part of the amounts that districts must pay for water. It would seem that if construction charges against the poor land are written off or suspended and the districts arrange with the bond and warrant holders to diminish their obligations proportionately to that recommended for reducing the debt to the Government, the districts will need no further relief.

**Recommendations.**—1. That the requests of the districts to extend the period of repayments of construction charges from 20 to 40 years be not approved.



2. That the districts be relieved from payment of construction charges on all permanently unproductive land, that charges be suspended on all temporarily unproductive land and that authority in law be secured for doing this when the land classification is completed and approved.

*Northport irrigation district, North Platte project, Nebraska-Wyoming.*—This district is requesting an 8-year moratorium on construction payments. Bills were introduced in both the United States Senate and House of Representatives providing for this.

The district includes about 16,000 acres of land in the extreme eastern end of the North Platte project. Of this about 12,000 acres are regarded as irrigable. It is indebted to the United States in the amount of \$1,112,695 for construction work, or about \$93 an acre. This is repayable in accordance with 5 per cent of the average gross annual crop returns. It paid one-third of the gross assessments in 1927, two-thirds in 1928, and will be billed on December 1, 1929, for a full construction assessment amounting to \$12,000. The district has repaid under the contract \$12,516.23 and is not delinquent. To meet this and other payments, however, the district has sold warrants amounting to about \$40,000. Delinquencies, including interest, now total about \$63,000. A large part of the acreage is delinquent in taxes. There is no evidence of strong leadership, and the water users themselves show little interest in the management of district affairs.

Water for this district is carried through the main canal of the farmers' irrigation district for which a charge of approximately \$8,000 a year is made. It is also obligated to pay the farmers' district for one-fifth of the cost of betterments and replacements to the canal. The Northport district has no voice in determining what work shall be done on the canal or in fixing or allocating the cost. If possible, the district should be represented on the board of the farmers' irrigation district which has this work in hand, or an audit of the costs should be accorded the Northport district. There would probably be no objection to this on the part of the farmers' irrigation district.

The soil at Northport is a prevailing light sandy loam. Successful tillage depends upon the development of sufficient organic matter in the root zone to retard the percolation of water to the lower levels and on an irrigation practice suitable to very sandy soils. The crop area in 1928 amounted to 11,240 acres, producing crop values of only \$20,900 an acre. Farms are poorly improved and lack good buildings and livestock. There is no credit available for providing these on any terms.

*Recommendations.*—1. The moratorium requested should not be granted. It would offer no substantial relief, as the benefits would accrue mainly to the owners of better lands, a large part of which are tenant-farmed.

2. The first objective of Government policy should be the increase of the productive power of the district, the vital feature of which is an improvement in the credit situation. There are some farmers on the project to whom loans for livestock and other productive purposes would be justified and they should be given consideration if and when some credit policy is adopted.

3. The district is also in need of more efficient leadership and management, and of additional agricultural service, especially, to work out plans of increasing the income from sandy soils and of stimulating livestock enterprises in the district. This service, however, should be provided without cost to the farmers or the district.

*Umatilla project, Oregon.*—This project is divided into two parts—the Hermiston irrigation district and the West irrigation district. Both districts have submitted the same requests. They ask that the total construction obligations owing the Government be written off and the lien released and that all water rights and title to the constructed works be transferred to the districts. They further request that the construction repayments heretofore made to the United States be returned to the districts to carry on reconstruction work and needed improvements to the irrigation system. They also ask that all construction charges due, delinquent, or to become due be suspended until the request for a write-off can be approved.

This project is located in the vicinity of Hermiston, Oreg., along the Umatilla River. The districts agreed by contract to repay the construction charges to the United States in accordance with 5 per cent of the average gross annual crop returns. The construction charges unpaid by the Hermiston irrigation district amount to \$1,066,803 and by the West extension irrigation district \$354,063. Fixed charges on the Hermiston irrigation district for 1928 were



\$1.80 an acre for construction and \$1.90 an acre for operation and maintenance. These items for the West extension irrigation district were \$1.90 and \$1.65 an acre, respectively. State and county taxes in each district range from \$1 to \$1.98 an acre.

The soils of both districts are extremely sandy. They are low in fertility and of poor waterholding capacity. As much as 10 acre-feet have been used on a single acre. This leaches out fertility as well as wasting water. Crop returns have gradually diminished. When broken up the soil is subject to drifting and often costs as much to relevel after a storm as was originally expended for levelling. The cost of levelling varies from \$30 to \$60 an acre.

The main crops of the project are alfalfa and irrigated pasture. The average yield of alfalfa in 1919 was 3.8 tons per acre. It has gradually diminished year after year until in 1928 it was 2.4 tons per acre. Areas being cultivated are growing smaller and in the Hermiston district 7,124 acres were cultivated out of an irrigable area of 11,730 acres. Much of the irrigable area has been settled and cultivated in the past but is now abandoned. There are at present 20 per cent fewer occupied farms in the district than in 1925. In the west extension district 7,000 acres are classed as irrigable. In 1928, 4,015 acres were irrigated. In this district from 500 to 700 acres have become water-logged in the last few years. It is not practical to drain these lands because they are underlaid with bedrock at a depth of about 5 feet. It seems clear to the advisers that original expectations regarding this project on the part both of the Government and of the local people who urged its construction have not been fulfilled.

The districts have been unable to meet the construction payments to the Government. It is all the farmers can bear to meet charges for operation and maintenance and replacements in the irrigation system. We are convinced that present conditions in these districts can not be sufficiently improved so that payments can be made to the Government. It is, therefore, believed that the construction charges should be written off, the Government's liens released, and title to water rights and irrigation systems transferred to the districts. It is not believed that construction repayments heretofore made should be refunded to the districts. The districts have had the use of the water and were further assisted by the Government carrying the operating costs during construction.

**Recommendations.**—1. The construction charges including delinquent operation and maintenance and construction payments due the Government on the Umatilla project should be written off and title to the irrigation systems and water rights should be transferred to the two irrigation districts comprising the project with the understanding that the Government will expend no additional funds on this project.

2. That the requests of the districts to refund to them construction payments heretofore made be not approved.

#### PRIVATE PROJECTS AIDED BY THE GOVERNMENT

Three private projects, included in this survey, have received aid from the Federal Government through the advance of funds to provide a more adequate water supply, reconstruct the irrigation systems, or assist in liquidating bonded indebtedness. Requests by these projects include extension of time of repayment, additional construction, and aid in refinancing. A discussion of these projects follows:

**Emmett irrigation district, Idaho.**—This district asks (a) that the repayment terms of the contract between it and the United States be extended from 20 to 40 years; and (b) that \$40,000 to \$100,000 be expended by the Government to install an additional pump and enlarge a siphon to increase the water supply to district lands.

This was a Carey Act project and is located in Payette Valley near Emmett. The main canal included 15 miles of hillside and flume construction in the canyon which could not be operated. At the district's request the Government constructed the Black Canyon Dam, which enabled the district to abandon the upper portion of the main canal. The district owed originally \$805,680 to the United States for this work. Payments to the United States under the contract began in 1927, and the district is not delinquent. The district owes about \$1,035,400 to bond and warrant holders and judgment creditors. The total irrigation debt amounts to about \$127 an acre. The following annual irrigation charges per acre are required at present to meet all obligations: Operation and

maintenance, \$2; Government construction, \$1.25; other creditors, \$4.90; or a total of \$8.15 per acre. Under existing agreements annual irrigation charges per acre for 19,500 acres regarded as irrigable are estimated as follows: In 1932, \$12.15; in 1936, \$15; and in 1941, \$15.85. State and county taxes range from \$2.30 to \$3.30 an acre.

The district has been unable to pay anything to private creditors. Part of the land is in producing apple and cherry orchards; but most of the cropped area, 18,768 acres in 1929, was devoted to alfalfa, red clover, small grains, corn, and irrigated pasture. The charges being assessed are excessive for the character of agriculture that can be followed in that locality.

The regeneration of this district depends on a reduction of interest and principal charges for irrigation. To this end an adjustment is pending with the district's private creditors. This includes redemption for cash of outstanding bonds at 50 cents on the dollar and redemption of warrants and interest on bonds and warrants at 35 cents on the dollar. Each landowner is to make his own arrangement to secure the money to pay his pro rata share (estimated at \$43 an acre) of the adjusted debt.

The Government is supplying more water to this district than required under the contract. Seepage losses are excessive. The district should puddle canals or prevent seepage by other means. After this is done, if the district still requires more water, it should provide the pumps and enlarge the siphon at its own expense and enter into a contract for the purchase of the additional water.

As a part of the cooperative program to improve the conditions of this district, the Government should extend its repayment contract from 20 to 40 years, but with the understanding that the district will take action to improve seepage conditions and provide additional construction work at its own expense and that a satisfactory settlement is made with its creditors.

*Recommendations.*—1. That, conditional on a settlement with the bond and warrant holders and judgment creditors as outlined above, a supplemental contract be entered into with the district extending the repayment period from 20 to 40 years, annual payments during this period to be equal. This will permit a reduction in the annual irrigation charges to approximately \$6 an acre, including interest at the Federal land-bank rate on the money which a majority of the landowners will have to borrow to settle with the district's private creditors.

2. That the district's request of the Government to finance installation of pump and enlargement of siphon be not approved.

*King Hill Irrigation project, Idaho.*—This district requests that \$360,000 be appropriated from the reclamation fund and be added to the amounts heretofore expended by the Government for repairs and reconstruction work in connection with the irrigation system.

This project was promoted under the Carey Act in 1908. The Reclamation Bureau had no connection with it at this stage. The promoter and his associates who financed it lost their investment. A receiver was appointed, and the State of Idaho took it over and operated it for a year or more. The State lost its money, and the Government was induced in 1917 to advance funds for reconstruction of a part of the irrigation works as a war measure to increase crop production. It expended \$1,987,254 for this work and for operating the system during construction. Of this amount \$497,285 was written off by the act of May 25, 1926, leaving a balance owing to the Government of \$1,489,969. The district has been unable to pay any portion of this debt to the Government.

The main canal is 52 miles long, located along a gorge through which Snake River flows. It is a succession of siphons, flumes, and hazardous earth canals. It is, therefore, difficult and costly to operate. Seven ditch riders are required during the irrigation season to patrol the irrigation system, but only 6,500 acres of scattered areas are irrigated. The cost of operating has been as much as \$5 an acre a year.

Soils are extremely porous and low in fertility. Nine acre-feet of water per acre were used in 1928. The farmers on the project are not prosperous.

The district took over operation and maintenance of the project in 1926. It has been unable to collect sufficient money to keep the system in repair, much less pay anything on construction charges. There is no prospect of its being able to pay the amounts now due or the amount they now request.

This district must be recognized as an insolvent enterprise. Every agency that has expended money on the irrigation system has lost its investment. The expenditure of additional funds by the Government would only add to its loss.

*Recommendations.*—1. That no further expenditures from the reclamation fund be made on this project.

2. That the entire indebtedness owing by the King Hill irrigation district to the United States be written off.

*Orchard Mesa irrigation district, Colorado.*—This district is asking that its period of repayment for construction be changed from 20 to 40 years. A committee which reported on the project in 1927 recommended a 30-year contract, but that was not acceptable to the district.

This is a division of the Grand Valley project, although operated under its own organization. The original irrigation system was financed by irrigation district bonds to the amount of \$1,075,000, and construction warrants, but failed due to faulty construction. At the urgent request of the district, the United States reconstructed the system and added drainage, its total expenditure amounting to \$999,768. The district agreed to repay this in 20 annual installments, of which the first four were each to be 2 per cent, the next two 4 per cent, and the remaining fourteen 6 per cent of the sum advanced. The district paid the first installment, but is delinquent on the second in the amount of \$11,089.

Out of approximately 10,000 acres in the district, about 3,500 acres are idle. Irrigation and State and county and school district taxes are delinquent on about an equal area, these amounting to about \$65,000.

The investigator who examined this district attributes its unsatisfactory financial condition to the following four causes:

(1) Low gross income per farm per acre, due chiefly to lack of adequate livestock, and well-balanced farm programs, these, in turn, being due very largely to inadequate farm capital.

(2) Poor soil conditions in the "seeped" areas.

(3) Idle land.

(4) Inequitable method of irrigation district assessment, under which all lands, regardless of production and productive capacity, pay the same annual assessments per acre.

Since 1923 the annual assessments have approximated \$6 per acre per annum. In 1928 the gross income per acre on 15 going farms outside of the main orchard section, ranged from \$30 to \$73, whereas, a gross income of \$200 to \$600 per acre and more is not uncommon in the peach section of the district.

*Recommendations.*—The advisors believe that aside from better farming and more livestock, the most urgent need in this district is a readjustment in irrigation district assessments, so that the land will be taxed for irrigation somewhat in accordance with its ability to pay. The better and more productive land does not need the relief asked for; it would not materially help the idle and poorer land. The advisers would grant the extension to 30 years previously recommended, only in the event the district agrees to a new assessment basis for district taxes, and also makes a more aggressive and more diligent attempt to improve its own condition through collections of assessments and the clearing of title to the better class of idle lands, so that they will be more attractive to purchasers. The details of the above suggested readjustments should be worked out with the district. A new land classification and a soil and drainage survey designed to set in a definite class seeped lands, if any, that are not worth reclaiming, would be found desirable, and in this the College of Agriculture has already expressed its willingness to assist.

#### PRIVATE DISTRICTS PURCHASING WATER OR POWER FROM THE GOVERNMENT

Five private projects purchase water or power from the Federal Government. This has enabled these private districts to obtain power at a low rate or to supplement their water supply from Federal storage. Their requests include aid in refinancing, more favorable water contract, reconstruction and reduction in area. They are discussed as follows:

*Shasta View irrigation district, Oregon.*—This district constructed its own pumping and distribution system and contracted with the Government for a water supply from the Klamath project in Oregon. Some additional construction work was done by the Government to enable it to deliver water to the district, the charge for this and for participating in use of the Klamath project system being fixed at \$34 per acre, exclusive of drainage, if found necessary, which is not to cost more than \$10 per acre. This construction charge was applied to 3,856 acres.

The district is delinquent in its payments to the Government for construction and for maintenance and operation in the amount of \$6,095.25 and in pursuance of law and the contract with the Government, is being refused water until its delinquencies are discharged. The district is also delinquent in the amount of \$16,220 in principal and interest on bonds issued for constructing its irrigation system, and owes other creditors \$14,134.36.

The request has been made that the Secretary of the Interior issue a new public notice reducing the area to which the construction charge shall apply to about 2,000 acres; that the amount of water to be delivered be increased from 2 to 2.5 acre-feet per acre; that water be furnished on a rental basis for a few years; and that demand for immediate payment of delinquent accounts be withheld. In the meantime, the district and the bondholders have entered into an agreement looking to the adjustment of bond and other indebtedness, their proposals, however, contemplating no reduction in acreage.

Shasta View irrigation district is in its present unhappy financial condition very largely because of lack of settlement. This has been aggravated by the known difficulty of establishing crops on some of the sandy soils, by the relatively high annual cost of pumping and carrying water in some of the canals, and more recently by the large delinquency in irrigation district assessments.

Elimination of areas too distant to be reached without excessive distribution costs and areas too sandy or too rough to be irrigated economically will improve the situation. Steps now being taken by the district and the bondholders to substitute individual for general liability for the general indebtedness of the district are expected to have a similar result, as is also their proposal to refund the bond indebtedness to longer periods of maturity with a reduced rate of interest.

In the judgment of the advisers, however, the annual charges for water will still reach the straining point for the average farmer, especially during the settlement period. In view of this situation it seems necessary that at least until the lands are earning the costs of operation and maintenance and construction repayments to the Government interest on the bonds be waived. Contingent on such an arrangement and on carrying out the remainder of the program outlined above, the advisers make the following recommendations:

(1) It may be that the private creditors will find it necessary to scale down the principal of their claims to a lower figure than thus far agreed to. The construction charge due to the Government should not, however, be reduced. It is moderate and is not the cause of the present difficulties. The responsibility for financial readjustment clearly lies with those who promoted and constructed the project, rather than with the Government, which merely contracted to furnish a water supply.

(2) That the area chargeable with construction and operation and maintenance be reduced to that which, after inquiry participated in by the Bureau of Reclamation, shall be found economically irrigable. This will involve no substantial loss to the Government other than a book loss, and the water thus released will be available to other lands. This should be done by the Government only on condition that the bond holders substitute as proposed individual liability in place of joint liability and that the districts assume no responsibility for payment of bond interest or principal on the land to be excluded.

(3) That repayments to the Government for construction, including those now delinquent, be suspended for a period of three years, provided the bondholders waive interest on bonds for a similar period, and the entire construction charge due on the area remaining in the project be made payable in equal annual installments over the remainder of the 40-year repayment period provided for in the present contract.

*Horsefly irrigation district, Oregon.*—This district requests that the Government (a) buy the present outstanding bonds of \$122,600, exclusive of accrued interest; (b) construct the necessary works to change from a pumping to a gravity system at an estimated cost of \$143,000; and (c) combine the unaccrued balances of contracts of \$140,926 to the United States, plus the bonded debt, plus the cost of additional construction, or a total of \$406,526, and make a new contract providing for the repayment of the total sum in 40 years without interest.

This district is a combination of a Warren Act and Government project near Klamath Falls, Oreg. It has an irrigable area of 10,432 acres, 5,900 of which are irrigated by means of pumps from Bonanza Springs and from the natural flow of Lost River, and 4,532 acres are under a joint contract between the district, the Langell Valley District, and the Government.

The financial arrangement between the United States and this district is of a complicated character under three contracts. The amount remaining to be repaid totals \$140,926.59.

The district also is obligated to pay the Government a perpetual operation and maintenance charge of 8 cents per acre on 5,900 acres and a portion of the operation and maintenance of the Clear Lake reservoir amounting to about \$200 a year. The total annual irrigation charges amount to \$4.08 an acre a year.

The district's present charges per irrigable acre to the Government amount to 30 cents for construction and 8 cents for operation and maintenance or a total of 38 cents an acre. The district states that the Government charges are not burdensome, but that interest on the bonded debt and the cost of pumping are the main problems of the district.

The advisers believe that the Government has discharged its full responsibility to this district and furthermore feels that the refinancing necessary to reduce the annual water charge should be arranged locally. The Government could not economically organize a construction force to build the relatively small additional works desired. Besides this, it now seems probable that the Klamath project will be taken over by the water users at an early date, and the Government should therefore assume no further financial obligations.

*Recommendations.*—(1) That the bonds of the district be not purchased by the Government.

(2) That no additional expenditures be made by the Government in this district.

*Stanfield irrigation district, Oregon.*—This district is in financial difficulty and is requesting the Government to (a) purchase its irrigation system for \$56,000; (b) carry out reconstruction work estimated to cost \$500,000; (c) provide additional drainage estimated to cost \$85,000; and (d) capitalize these amounts (\$641,000) with the cost of stored water (\$695,000), and that the new debt be made repayable to the Government in 40 years without interest.

The district includes 8,360 irrigable acres in eastern Oregon in the vicinity of the Umatilla project. About 3,400 acres are irrigated. The crops grown are similar to those of the Umatilla project, including alfalfa and irrigated pasture as the major enterprises. The Government's only connection with it is that in September, 1923, it contracted to sell to the district a share in McKay reservoir, the district assuming its share of the estimated cost of the reservoir.

If the Government accedes to this request it would have \$182 per irrigable acre invested in a district largely unsettled and undeveloped. The objection to doing this is that it will almost certainly entail a heavy loss to the Government due to the inability of the district to meet the payments this expenditure would require.

*Recommendations.*—(1) The Government should not invest additional money from the reclamation fund in this enterprise.

(2) It is believed that this project can not carry the full cost of irrigation works and that there should be a readjustment which recognizes this. The State of Oregon and the Government should join in attempting to work out a plan by which the resident farmers' investments and the development they have made can be saved. In view of the large expenditure that has already been made by the Government in McKay Reservoir the State of Oregon should join in responsibility for any further construction that is needed. If a satisfactory readjustment can not be worked out in the manner proposed above, the Government should continue to furnish water from McKay Reservoir on a rental basis, but should make no further expenditures.

*Westland irrigation district, Oregon.*—In 1923 this district requested the Government to purchase their outstanding bonds amounting to \$87,500, expend about \$60,000 for reconstruction work and capitalize these expenditures with the cost of McKay water being supplied the district under contract (\$1,023,750), and make this new debt repayable in 40 years without interest.

This request has since been modified. The district proposes to repay the bond holders and make their own improvements of the irrigation system out of revenue, provided the Government will modify its contract on more favorable repayment terms.

Of the 10,500 acres regarded as irrigable, about 4,500 acres are irrigated. Since January, 1929, 450 acres have been sold to settlers and development is gradually increasing.

The soils of this locality vary from fine sand to fine sandy loam. It is adapted to growing alfalfa and irrigated pasture, and has been producing

about three tons of alfalfa an acre with a full water supply. Farmers of the district are paying irrigation charges of about \$3.50 an acre. This can not be increased without retarding development.

The district proposes paying 85 cents an acre to the Government for the years 1930 to 1934, inclusive; 93 cents an acre for 1935 to 1944; \$2.83 an acre for 1945 to 1949, and \$3.02 an acre for 1950 to 1959. This has the effect of extending the repayment terms from 30 years to 40 years but on a graduated scale. This plan would permit the district to keep its annual assessment at \$3.60 an acre for five years and the maximum assessment for irrigation purposes to \$4.87 an acre for the years 1950 to 1959.

*Recommendations.*—(1) The request for a modified repayment contract for the purchase of water from McKay Reservoir extending the repayment period to 40 years, should be approved.

*Gem irrigation district, Idaho.*—The district requests the Government to purchase its irrigation system for \$350,000 to enable it to settle a debt amounting to about \$1,000,000 owing its private creditors.

This district was constructed by private enterprise in 1913. The private creditors gave the district an option which expired on September 18, 1929, to settle its outstanding bonds and accrued interest for \$350,000 plus 50 per cent of the sale price of some substantial areas of land owned by the district plus the entire recovery value of the pumping plants and electrical systems owned by the district. It is unable to raise this money from private sources.

The Government has refused to furnish this money for the past three years, because it would mean substituting Government management in place of local management by the water users, which is contrary to the Government's policy. The local management is very efficient, and, under it, charges have been reduced, seeped lands reclaimed out of current revenues, and general improvements have taken place in the conditions of the district and the farmers.

The Government has been of great service to this district by furnishing it with cheap power from the Black Canyon power plant, thereby reducing the district's annual power bill for pumping about one-half.

The contract between this district and the United States, which provides for furnishing water from the Owyhee Reservoir now under construction, will result in a further reduction in irrigation assessments. The Government is obligated to expend \$18,000,000 in the construction of the Owyhee project, of which the Gem district is a part.

*Recommendations.*—That the irrigation system be not purchased by the Government.

#### PRIVATE PROJECTS REQUESTING AID FROM THE GOVERNMENT

*Bitter Root irrigation district, Montana.*—This district requests the Government to buy for about \$500,000 its outstanding bonds and warrants and reconstruct flumes on the main canal estimated by the district to cost \$254,144.

This is a private project of 20,000 acres in Ravalli County, Mont. Irrigation works were constructed in 1910 at an estimated cost of \$2,000,000. This included a main canal 72 miles long of which about ten miles is in wooden flumes, part of which is unsafe and must be rebuilt.

The project began on a speculative basis and the original company failed. The district was then organized and in 1923 sold \$600,000 in bonds bearing interest at 6 per cent to purchase the irrigation system for \$75,000 and replace about half of the old flumes. Present indebtedness is \$577,000 for bonds and \$82,000 for warrants. Irrigation assessments were \$5 an acre in 1927 and 1928, but only 9,644 acres made payment in 1928. Delinquent taxes amount to \$66,000 and the district acquired land through tax sale which amounted to 4,509 acres in 1928. The district is unable to meet its payments to bondholders and secure funds to reconstruct the remainder of the flumes which need rebuilding.

About 14,700 acres were irrigated and cropped in 1928. Crop values are estimated by the district at \$45 an acre. The main field crops are alfalfa, barley, beans, sugar beets, corn, head lettuce, oats, peas for canning and seed, potatoes and irrigated pasture. Orchards cover 2,571 acres, mostly in McIntosh apples. The area is well served with transportation, creameries, cheese factories, canneries, and one sugar factory at Missoula. The farmers are well organized and the district is in a high state of agricultural development.



It is apparent that the reclamation fund can not be used for purchasing outstanding bonds and reconstructing the irrigation system of this district and for aiding many other private enterprises requiring help without disrupting the program to which the Government is already committed. There is no question that such aid for this district and many private projects is urgently needed, but if provided from the reclamation fund the work now in progress on other projects would necessarily have to be curtailed, resulting in many cases in uneconomical construction and delaying the benefits of the works which are now urgently required on Government projects.

It is believed that this request and the needs of many other private projects should be considered by Congress. If favorable action is taken by Congress it is believed the money required should be provided outside of the reclamation fund, and interest on the amounts advanced should be collected.

**Recommendations.**—(1) That requests for aid to private projects should be dealt with in accordance with the discussion under "Federal Aid to Irrigation Districts and Other Private Projects" discussed elsewhere in this report.

(2) The advisers believe that if Congress authorizes the bureau to extend aid to private projects, the requests of this district merit consideration since the unsafe condition of the main canal and the high annual water charges are tending to depopulate this district which has otherwise favorable conditions of development. The district has been unable to raise from private sources the money needed to reconstruct the main canal. If money is furnished for this purpose there should be a substantial reduction in the bonded debt, and the expenditure should be contingent on a satisfactory settlement plan being made and agreed to by the State and other interested agencies.

**Palo Verde irrigation district, California.**—This district requests the Government to assume control of its levee system and reimburse the district for past expenditures of some \$3,000,000 for levees and river control.

This is a private project comprising some 90,000 acres, lying along the Colorado River about 70 miles northeast of Imperial Valley.

The bonded indebtedness of the district for levees, drainage, and irrigation is \$4,259,330, or an average of \$47.45 an acre for the gross area of 89,693 acres, or \$65.50 an acre based on 65,000 acres susceptible of irrigation. Operation and maintenance assessments are \$17.50 an acre for the best land, and average \$15 an acre for the producing land. State and county taxes vary from \$2.25 to \$2.80 an acre on the productive land.

**Recommendations.**—(1) This district has the same grounds for claiming Government assistance in maintaining levees and protecting its lands from destructive floods on Colorado River as the Yuma project and Imperial Valley on the same river and as the landowners have along the Mississippi. The need is urgent in Palo Verde Valley and in the judgment of the advisers the Government should assume control of the Palo Verde levees along the Colorado as a part of the general treatment of Colorado River in connection with Boulder Canyon Reservoir.

(2) In view of the impossible burden which the Palo Verde farmers have assumed in the past, the valley should be reimbursed out of the General Treasury for such past flood-control work as is found to be of value in the general handling of the river. The advisers are not informed, however, as to the extent of such reimbursement which is justified.

#### PROJECTS NOT MAKING SPECIFIC REQUESTS, BUT INVESTIGATED

The Lower Yellowstone and Milk River (Malta and Glasgow divisions) projects did not make specific requests of the Government, but were included in the investigation because a considerable area on each project is unirrigated. The major works for these enterprises have been completed for a number of years, and development has been slow. A lack of settlement and development, while not preventing these districts from paying present charges, may seriously affect their earning power and their ability to meet the repayment contracts between them and the United States in the future.

The Sun River project (Greenfields division) was included because a full water supply had just been provided for this division by the construction of Gibson Dam, and the main canal is now being enlarged. The project, therefore, is in position to make a program of settlement and farm development which will utilize this water supply.

The Willwood division of the Shoshone project and the Riverton project, both in Wyoming, were included because they are comparatively new. Settle-

ment and farm development had just begun. Future payments to the Government depend on how quickly and satisfactorily farms are brought under cultivation.

In all of these projects the Government has invested its money in irrigation works, and the Reclamation Bureau desired to know how conditions on these projects could be improved and what plans should be inaugurated to insure repayments to the Government in accordance with the reclamation act.

The Owyhee project now under construction was included at the request of the Secretary of the Interior because it will involve the expenditure of \$18,000,000. It was investigated before construction was authorized, but it was believed advisable to check the reports heretofore made and consider what should be done in the light of present economic conditions.

The investigation of the Malin irrigation district was requested by a few leaders in that district. They asked that a study of conditions be made at Malin at the time of making investigation at Shasta View. The relations of the Government to both districts are somewhat similar and those interested believed its problems also should be considered.

Below is given a discussion of the above-named enterprises, including recommendations of the advisers:

*Milk River project (Malta and Glasgow divisions) Montana.*—The Milk River project, in northeastern Montana, includes the Malta, Glasgow, and Chinook divisions. The Chinook division has been discussed. The Malta and Glasgow divisions are organized into the Malta and Glasgow irrigation districts.

Contracts with the districts provide for the repayment of construction costs of \$57 an acre in 40 years without interest. The annual construction payments are to begin in 1932 and continue at the rate of \$1.42½ an acre a year. There is no question of the better grades of land being able to make payments; but there is doubt regarding the gumbo soils, which are extensive, being able to meet this cost.

The development of the project has been slow and unsatisfactory. Of 72,455 acres to which water could be furnished in 1928, only 15,832 acres were irrigated, producing an average crop value of \$13.40 an acre. In addition 19,100 acres were dry-farmed, producing crops valued at \$10.02 per acre. The low crop value and slow development are believed due to (a) rainfall sufficient in most years to produce wheat and a number of other crops without irrigation; and (b) spotted character of soil, including the large area of heavy gumbo soil.

What should be sought in these districts is a management which would stimulate local pride and self-reliance. This year assessments are being made to meet full operating expenses. It should be possible under this condition for the water users to take over the properties and manage them, which is in accordance with the Government's present policy.

*Sun River project (Greenfields irrigation district) Montana.*—The Greenfields division of the Sun River project is organized as an irrigation district. It includes a compact irrigable area of 93,031 acres, of which 41,975 acres are under constructed works. The Government has expended to June 30, 1929, approximately \$6,700,000 on this division. When completed the amount to be repaid to the United States will be approximately \$9,535,000.

The district has agreed to pay this amount in accordance with 5 per cent of the average gross annual crop returns for land under the completed system, approximating 42,000 acres, and in 80 semiannual instalments for land under the uncompleted system, payments to commence on the dates announced by the Secretary of the Interior. The Government is directed by law to collect the amount under the terms fixed by the contract. This can only be done after the districts becomes settled by good farmers who will farm intensively and create a prosperous district. About 200 more settlers are needed. How far the district is from this prosperous and desirable condition is shown by the fact that of the 41,975 irrigable acres, only 7,860 acres were irrigated in 1928, and that of 30,540 acres cropped 20,384 acres were cultivated to wheat.

In other words, the Government has spent its funds to provide water, and is confronted with the question of what must be done to secure 200 more farmers to develop 200 additional irrigated farms to make use of the water.

For the most part the lands are level with sufficient slopes for irrigation. The soils are easily worked and fairly productive. Crops grown include alfalfa, sweet clover, small grains, potatoes, sugar beets, and hardy vegetables. The Gibson Dam, recently completed, assures a reliable water supply. Irrigation charges and taxes are estimated to average about \$2 an acre with probable future payment amounting to \$3 an acre.



The investigations showed that a settler should have \$5,000 in cash and equipment in order to develop a farm, and that \$7,500 would be better. Very few settlers can be secured with as much capital as this, and only small amounts can be borrowed from banks on short terms and at high rates of interest. No credit is available for improving farms.

*Lower Yellowstone project, Montana-North Dakota.*—This project is divided into two districts, one in North Dakota and the other in Montana. Its present irrigable area is 58,250 acres. The districts have agreed to repay the Government \$4,138,368, which amount is exclusive of \$25,818 paid for irrigable lands used for railroad right of way. This amounts to an average of \$66 an acre in annual installments computed on 5 per cent of the average gross annual crop returns. The above cost includes drainage work now under construction to relieve seeped lands, which is estimated to cost \$525,000. The annual construction charges average about \$1.50 an acre, and the annual operation and maintenance charges about \$1.10 an acre.

Under the contract the districts contribute in advance the operation and maintenance cost, and beginning in 1929, full construction assessments are required. In 1927, 50 per cent of the full construction payments were assessed, and in 1928, 70 per cent. The districts have met the payments under this contract.

This is the first year under the new contract that full payments are required. Prospects are that they will be made promptly, although water users are apprehensive about being able to continue such payments in the future. The problem of the Government is to collect these payments, and it is realized that this can be done only by complete irrigation and cultivation of all project lands.

The soil is productive and the climate is suitable for growing alfalfa, sweet clover, small grains, corn, great northern beans, peas for seed, sugar beets, potatoes, and irrigated pasture. The water supply is abundant. A sugar refinery is located on the project. Transportation facilities are excellent. Markets for livestock are St. Paul and Chicago.

Notwithstanding these favorable conditions, only 19,770 acres, or less than 40 per cent of the irrigable area were irrigated in 1928. Since 1924, the Bureau of Reclamation, the railway companies, the Holly Sugar Corporation, and the Irrigation district boards have made a continuous effort to settle unoccupied farms. Options were taken by the Government on 77 farms at prices fixed by appraisal. Twenty years were given in which to complete paying for them. The interest rate was 6 per cent and payments were to be amortized. Of the farms under option, 20 were sold. About 15 other farms were also sold.

Experience of the past five years shows that tenants or purchasers prefer partially developed farms. None were secured for undeveloped farms. Non-resident owners were generally unable to finance the building of houses and the improvements required to make farms ready for settlement, and no agency at present will advance money to these owners or to new settlers for these purposes. Local banks make loans on chattels or on growing crops on short terms at 10 per cent. This is not adequate to assist new settlers to develop farms.

*Riverton project, Wyoming.*—The project is located in Fremont County, Wyo., on the southeast portion of the Wind River Indian Reservation. The Government expended to June 30, 1929, for construction and incidental operations \$3,850,570. This provides part of the major works for 100,000 acres of irrigable land and laterals and distribution systems which will be completed in 1930 for approximately 60,000 acres.

Water is available at present for 20,000 acres, and is being furnished on a rental basis at the rate of \$1 an acre for 2 acre-feet of water. If needed, additional water is supplied at 50 cents an acre-foot.

Riverton's problem is one of settlement. Except for a few scattered farms on private and public land, the project is virgin territory. Over two-thirds of the area to be settled is public land. Private unimproved land sells for \$10 to \$25 an acre. However, there are several serious obstacles to settlement, including:

- (a) Lack of railway transportation.
- (b) Undeveloped appearance of the project.
- (c) Lack of capital on the part of settlers to develop raw land.

The nearest lands ready for settlement are 9 miles distant from the railroad, which is too far for profitable cultivation of sugar beets. Endless tracts

of sagebrush are discouraging to prospective settlers, who can not be certain that any given area will respond generously to their labor. More cultivation is necessary to give an ocular demonstration of what can be accomplished.

The minimum sum required to assure the development of a farm unit is estimated at \$5,000. At present there is very little money to be had at Riverton on any terms.

*Shoshone project, Willwood division, Wyoming.*—The Willwood division of the Shoshone project comprises about 12,000 acres along the south bank of the Shoshone River. The division is relatively new. The first unit was opened to entry in 1927 and the third in 1929. In all 7,823 acres have been opened for settlement.

The total cost of the irrigation works and incidental expenses is estimated at \$1,372,200, or an average of \$114.35 per irrigable acre.

Forty-one settlers have farms on this division. They had capital varying from \$2,000 to \$9,600. However, only two had capital above \$5,000. The others had much less than this amount. The great need of these settlers is credit to supplement their capital. This is not available at present.

With credit provided, this division should succeed, as the water supply is abundant, and the soil and growing season permit the production of alfalfa, sugar beets, potatoes, grain, and most crops common to the Temperate Zone.

*Conclusion.*—1. The problems of Shoshone (Willwood division), Milk River, Sun River, Lower Yellowstone, and Riverton projects are similar. The Government has invested its money and is required by law to collect it in accordance with the contracts with these projects. This can be done only if the lands on these enterprises are cultivated and irrigated. On some of these projects water has been available for 15 years or more, and the projects are far from being completely settled and cultivated. The Government depends on this being done in a reasonable time and under conditions where settlers will prosper if payments to it are to be made promptly. Lack of suitable credit to assist settlers in improving and equipping farms is the main obstacle to be overcome.

2. This credit should be provided under the plan outlined elsewhere in this report. Cooperation by State agencies in settlement and credit is urgently needed.

*Owyhee project, Oregon-Idaho.*—This is a Federal project located in eastern Oregon and western Idaho in the Snake River Valley. Construction work began in October, 1927. The irrigation works will furnish a complete water supply to 111,000 acres, including the Gem district, and a supplemental water supply to 12,000 acres. The estimated cost of the project is \$18,000,000. Forty-one thousand acres, now settled and farmed intensively, are in small irrigation districts along Snake River, and get water by pumping from that stream. Building the Owyhee project will furnish these districts gravity water at a lower annual rate, the present cost being excessive.

The project includes about 70,000 acres of new land, mostly privately owned, for which a complete irrigation system will be constructed. This will cost approximately \$165 an acre. The construction cost for the old lands will be approximately \$150 an acre, and \$25 an acre for the lands under the Owyhee ditch, which require supplemental water.

Construction money advanced by the United States is to be repaid under contracts entered into with the Owyhee irrigation district in Oregon, the Gem district in Idaho, and the Owyhee Ditch Co. Repayments are to be made under the 40-year plan for new projects, without interest.

Some of the irrigation districts which are included in this project are in financial difficulty and are unable to pay the bond and warrant holders. Unless these private debts are settled the districts will be unable to pay the Government. These districts should make a satisfactory settlement with their creditors before works are constructed by the United States for their benefit. It is also believed that public notice to these districts requiring construction payments should be deferred for several years, as is done in the case of new land, to permit the old lands to discharge their private debts. Such debts should be adjusted so they can for the most part be paid within this period.

Furnishing these districts with surplus Government power from the Black Canyon power plant will also aid them by reducing power bills. This should be done if and when power is available.

The reclamation law now provides that different construction charges may be fixed against different classes of land in accordance with its productivity. The difficulty with this plan is that it is impracticable to foresee the conditions

which will affect productivity, and the acre return over the repayment period. State laws should be amended to permit the assessment of irrigation charges on an equitable basis which would vary from year to year with changing conditions.

Contracts have been made with landowners requiring the sale of surplus land (tracts held in excess of 160 acres in one ownership) at prices fixed by independent appraisal. These prices vary from \$5 to \$15 an acre for irrigable land and from \$1 to \$2 an acre for nonirrigable land.

Contracts have also been made with landowners of nonexcess lands (held in ownerships of 160 acres or less) providing that if sales are made in excess of appraised value, that half of such excess prices shall be paid to the irrigation district to apply on the construction cost or other irrigation charges against the tract of land disposed of.

The soils are fertile, and the climate favorable for the production of high yields of alfalfa, red clover, corn, potatoes, small grains, truck crops, and irrigated pasture. The value of crops on first-class land under good management is estimated at \$45 an acre, and on second-class land at \$35 an acre, with an average of about \$40 an acre for the project.

On the project are four modern towns having schools, churches, and all business facilities to serve farmers. It is served with good railway transportation and arterial highways. Markets are Portland and Pacific coast points.

The project is within a well-developed and profitable dairying and livestock section. Abundant yields of forage and grain, supplemented with irrigated pastures of good carrying capacity favor cheap production of livestock and livestock products.

There are no other large areas of undeveloped lands of equal quality or price available for settlement in southern Idaho and eastern Oregon. The overflow from the older settled areas in this section of the country will naturally come here. This leads to a belief on the part of those of the advisers who have seen the project that development will be successful, both as to promptness and the capabilities and character of the settlers.

*Conclusions.*—1. While this project has excellent soil and climate, and large yields of general farm crops are obtained, nevertheless, it is of high acre cost, requiring that settlers farm intensively, and keep high-grade stock. The development, therefore, requires the wholehearted cooperation of the States of Idaho and Oregon in settlement and in providing credit to create well-equipped farms producing large returns.

2. The works for the benefit of private districts within the Owyhee project should be held up until a satisfactory settlement is made with the district's private creditors.

3. Public notice requiring construction payments from the land at present irrigated should be deferred for the same period of time as is usually given new lands, in order to permit the districts to pay adjusted private debts.

4. Surplus power, if any, from Black Canyon power plant should be made available to the districts now receiving water by pumping which will permit a reduction in the pumping charges.

5. Assessments of construction charges should vary with the different classes of land, but should be adjusted annually in accordance with the productiveness of farms. Amendments to state laws should be sought to provide for this.

The Duck Valley Indian Reservation was also investigated in connection with the Owyhee project because of a proposal to develop more land under irrigation on the head waters of the Owyhee River. The investigators concluded that such development would not reduce the water supply of the Owyhee project if the development at Duck Valley is confined to the actual needs of the Indians.

*Mallin irrigation district, Oregon.*—This district has made no request of the Government, and has promptly met all payments due to the Government. The conclusions reached regarding the Shasta View district do not apply in the case of the Mallin district.

Nearly half the area of the Mallin district was irrigated in 1928, the third year that water was available. The irrigable area has been fixed at 3,479 acres, upon which reside about 50 families.

The faults of its early bond maturities have in part been corrected by action of the bondholders, who also have the largest land interest in the district.

Lack of adequate capital by land purchasers is the principal difficulty of the district at present. With such concessions as those who hold the large land interest in the district are disposed to make, the prospect of this enterprise working its way out and becoming successful are considered favorable.

## PART III.—RECOMMENDATIONS AS TO POLICY

While the general principles of reclamation as a public policy have stood without effective challenge throughout the history of the service, many questions of administration and even important questions of policy were necessarily left unsettled at the time the reclamation act was passed, to await the accumulation of experience. In the opinion of the investigators, these questions should now be given serious consideration.

Some of these questions involve merely the formal elaboration of procedure that has been applied under various conditions by the Reclamation Bureau. Such, for example, are the principles to be followed in undertaking new projects or extending existing projects, the revision of existing contracts, the treatment of lands of varying productivity, the selection of settlers. Other points involve an extension of policy, such as the provision of technical assistance and credits to settlers and above all, the proper relation of the Federal and State Governments in respect to reclamation policy. In the following discussions it has not been practicable to treat each point in isolation, nor even to distinguish clearly between the formalization of existing practices and proposed extensions of policy. There is an inevitable interdependence of points of policy, as for example, between settlement and credit, State participation and selection of new projects.

## THE ALLOCATION OF COST OF MAJOR WORKS

In the various private irrigation enterprises launched prior to the reclamation act and after, it was taken as a matter of course that the cost of all works, diversion or storage dams, canals and reservoirs, ditches and laterals, should be borne by the lands benefited. Following this principle, only such projects could be launched as involved no excessive construction charges. The Government, in adopting the principle of repayment of construction charges over a period of years, without interest, greatly extended the range of practicable projects. Immense volumes of water could be stored in the nonirrigation months of the year to increase the area of irrigated lands and to insure the regularity and adequacy of water supply during the crop growing season.

The provision of interest-free money for construction is, as has been noted above, a subsidy, justified by the national policy of aiding in the establishment of a stable agriculture in the arid-land States. It is by no means clear that this subsidy is in every case adequate, or that it has been properly apportioned as among the several reclamation projects. Nor is it clear that in every instance the lands benefited should pay the whole cost of construction, even though on an interest-free basis, nor even that such portion of the cost as is to be paid by the Government should be borne by the reclamation fund.

To the arid section of the country, water conservation is a vital interest. It is quite as vital an interest as flood control or the maintenance of channels adequate for navigation in rivers or harbors is for other sections of the country. Prolonged drought in any of the arid-land States is capable of seriously disrupting its economic life through loss of livestock, unless water supplies are properly conserved.

Such considerations lead to the conclusion that, perhaps, the Government is pursuing too narrow a policy in restricting construction for water conservation to works which can be paid for in a given period of time—20 or 40 years—by charges upon the irrigated lands benefited, and further, to works that can be financed out of the limited reclamation fund. Very little of the Federal work on flood control, river navigation, or harbor development could have been undertaken if the principle of financing through charges for specific benefits had been followed.

It is recommended that a thorough survey be made of the requirements of the arid-land States for water-conservation works, with a view to determining how far such works should be financed independently of reclamation funds and of prospective charges upon the settler on irrigated lands.

## BASIS OF APPROVAL FOR NEW PROJECTS

Until the Federal Government adopts a policy of financing works of water conservation independently of the reclamation fund, the Reclamation Bureau should judge each proposed new project on the basis of its capacity to carry

construction charges under the plan now in operation. Approval of new projects should be based, not only on the surveys of water resources, storage possibilities, drainage requirements, and engineering features of construction and operation, but also upon (1) a detailed soil survey and land classification; (2) a comprehensive survey of possible crop and livestock production, markets, transportation costs, and estimated probable returns; (3) the cost of preparing lands for farming and minimum cost of necessary farm buildings and other required equipment.

If local and State demands insist on the construction of a project whose estimated cost exceeds the ability of lands in that region to liquidate, the State should be required to show its faith in the ultimate benefits of the project by offering through legislative enactment to share, with the United States, on a dollar-for-dollar basis, the excess in the per acre cost over the ability of the lands to liquidate.

LANDS DESIGNATED BY SECRETARY OF THE INTERIOR AS TEMPORARILY AND  
PERMANENTLY UNPRODUCTIVE

In 1925, because of distress on some projects, the Secretary of the Interior appointed the board of survey and adjustments which, among other duties, classified the land on 19 projects to provide a basis for equitable adjustments with water users and to determine the area of land incapable of paying irrigation assessments.

Temporarily unproductive lands were defined as lands not at that time susceptible of agricultural use, but which might gradually, by tillage and under changing conditions, be made sufficiently productive to justify cropping. Alkali and water-logged lands that might be improved by drainage; excessively heavy soils that might be improved by the incorporation of organic matter or other fertilizers; light, sandy soils that might be firm by plant roots; steep soils that might be leveled; and other such soils were included in this class. The permanently unproductive land was defined as land that appeared to be permanently nonagricultural under the practices of irrigation farming.

The board designated 207,342 acres as temporarily unproductive and 174,448 acres as permanently unproductive on the several enterprises.

The act of May 25, 1926, generally known as the adjustment act, authorized the suspension of construction charges against temporarily unproductive land and the writing off of construction charges against permanently unproductive land. It also provided that such unproductive lands could be exchanged by their owners for public land of better soils on the same project or on some other project. These exchanges have been quite generally made and the Government now owns a large acreage of unproductive land within the boundaries of these projects. The department has wisely refused to open these lands to entry for homesteading. Resettlement under the homestead laws would only involve new settlers in the same difficulties as beset the former settlers. These lands, although of some value, may properly be classed under present conditions as a liability to the Interior Department, which must administer them.

They have some value for pasture to adjacent landowners and there is a probability that the better grade of them may eventually be brought into profitable production. The present laws and regulations provide that entrymen may acquire them by amending their original entries. A portion of these lands have thus been acquired, and afford pasture for cattle or sheep, but the further acquisition of these lands by resident settlers is as a rule prevented by legal restrictions upon the ownership within a reclamation project of land by one individual exceeding 160 acres prior to the time when the project charges are paid in full.

The lands may be leased under present laws and regulations, and this is being done so far as practicable. The difficulty with this practice, however, is that tenants can not be expected to expend money or labor for improvements on the better grade of these lands without the prospect of ownership.

Under the present practice the lands are a burden on the water users also, because often laterals which must be maintained pass through them, paying no revenue to the irrigation project. Where title to such lands has been acquired by adjacent landowners, a large part is being irrigated for pasture and the project is collecting operation and maintenance or water-rental charges. In some cases the land has been actually reclaimed by the owners and is pro-

ducing good crops. In such cases both the Government and project are benefiting, the Government being paid the construction charges and the project the operation assessments.

These lands will be put to their most profitable use and future administration losses prevented if both private landowners and entrymen actually residing on projects can acquire the lands for pasture or other purpose under safeguards which will generally prevent the lands from being entered or purchased by new and inexperienced settlers. The procedure for doing this should include legislation by Congress along the following lines:

1. The Secretary of the Interior should be given authority to sell such lands to resident owners or entrymen at low prices to be fixed by an independent appraisal.

2. No owner or entryman should be permitted to purchase more than 160 acres of such land, or an area which, together with land already owned by such owner or entryman on the project, should exceed 320 acres.

3. Such land when sold should remain subject to construction charges if and when it comes into profitable production.

4. When such land is paid for, patent should issue reciting that the land has been classified as temporarily or permanently unproductive subject to the provisions of the act of May 25, 1926.

5. All sums collected from such sales of land should be credited to the reclamation fund.

6. The law should apply not only to tracts wholly classified as temporarily or permanently unproductive, but also to all tracts of public land in Federal projects which by reason of the inclusion of unproductive lands are found by the Secretary of the Interior to be insufficient to support a family and pay water charges. As an illustration this would apply to a farm unit of say 60 acres which includes 10 or 15 acres of good land, but with the remainder being unproductive. Such a unit is insufficient to support a family and pay charges. Furthermore if the poor land was disposed of it would leave the 10 or 15 acres of good land which may not be served by a road or an irrigation lateral. Disposing of the entire unit would save also in the cost of subdivisional surveys which often amount to more than the land is worth.

A bill, H. R. 156, pending in Congress, embodies these provisions except those set out in paragraph 6, and if enacted into law, would permit the disposal of these lands under the above conditions. It is believed that this bill offers a satisfactory solution of this problem and should be recommended for enactment into law with the following amendment to include the conditions set out in paragraph 6 above: "and the authority given the Secretary hereunder shall apply not only to tracts wholly classified as temporarily or permanently unproductive but also to all tracts of public lands within Federal irrigation projects which by reason of the inclusion of lands classified as temporarily or permanently unproductive are found by the Secretary to be insufficient to support a family and pay water charges."

#### LAND OF LOW PRODUCTION

In the beginning of irrigation development there was a tendency to assume that all arid land is fertile. Experience has shown this to be an error. Land of low production is found on some Federal projects and also on some private enterprises. These include lands of heavy or extremely sandy soils or fairly good soils of broken or uneven topography. Settlers require more capital and experience to subdue and improve them than is needed to develop farms of more responsive soil. These lands are generally the last to become permanently settled and the first to go delinquent in irrigation assessments.

The Belle Fourche project, in South Dakota, includes about 14,000 acres of heavy soil locally known as "gumbo." It is somewhat cold, hard to work, and costly to cultivate. It is therefore not attractive to beginners, although when subdued and properly cultivated good yields of general farm crops are secured. At present much of the land of this character is not being farmed by either resident owners or tenants but by neighbors who contribute to the owners as rental a part of their scanty crops. They have no incentive to rotate crops, add to the fertility of the soil or keep improvements in repair. On the contrary, crops are poorly cultivated and improvements are allowed to deteriorate.

The Milk River project, in Montana, also includes a large area of "gumbo" soil similar to the heavy land at Belle Fourche. At present it is in pasture



oint meadows producing one-third to one-half ton of hay an acre. The  
nds of this project are generally owned in large tracts of 100 acres  
d are even less improved than the gumbo lands of the Belle Fourche  
mprovement and cultivation of these lands are difficult because of  
an unusually flat topography which makes drainage both difficult

y.

h projects the districts expect these lands to pay their share of  
1 operating and construction charges. Under State laws these lands are  
a at the same rate per acre for operating and for construction as are  
the better lands of the districts.

The soil on the Northport division of the North Platte project is prevailingly  
a light sandy loam, fairly rich in organic matter on the level land and in de-  
pressions. On the ridges and exposed slopes it is very sandy. It is low in  
fertility and of poor water holding capacity. Successful tillage depends on  
the accumulation of sufficient organic matter in the surface soil to retard per-  
colation of water to the lower levels. This demands a scheme of tillage based  
on hay, pasture and dairying or stock raising with only occasional row crops  
until the land has become stabilized. Unusually skillful irrigation practice is  
also essential. The construction assessments vary on this project in accordance  
with crop production but operation and maintenance charges are uniform re-  
gardless of the ability of the land to produce.

When these low producing lands default in payments of operation and  
maintenance and construction, the theory of joint liability is that the paying  
area shall meet the deficiency by increasing the assessment rate. This leads  
to pyramiding taxes on the lands which continue to be assessed, and this gradu-  
ally but surely brings insolvency to the district. These increasing assessments  
drive out settlers and prevent new settlers from locating in the district. This  
is most serious on projects including large areas of low producing lands upon  
which equal assessments for all irrigation purposes are made regardless of  
fertility or, in other words, where the poorest farm is required to pay the  
same charges per acre for irrigation as the most productive farm.

#### ASSESSING THE PROJECT COSTS

The situation described in the above paragraphs brings out very clearly that  
in the case of some of the projects the costs of construction and of mainte-  
nance and operation are not being equitably allocated. This is especially true  
where there is a wide disparity in the productive value of the land. For  
instance, in the Orchard Mesa division of the Grand Valley project, lands  
which, because of low productivity or unfavorable location with reference to  
seasonal frosts, are yielding gross returns of only a few dollars per acre,  
are called upon to pay the same annual irrigation rate as lands yielding gross  
returns of \$500 or more per acre. This is an exceptional condition, but it will  
illustrate the need for a revised policy in assessing the charges where the  
range in productive value is wide.

Most of the Federal reclamation projects are now operated as irrigation  
districts organized under State law. In Idaho, Wyoming, Utah, South Dakota,  
and Nevada, the benefits to accrue to each tract of land from the construc-  
tion and operation of the irrigation system are determined in advance and  
such benefits constitute the basis for all future assessments. In Washington  
benefits are determined annually. In Montana, New Mexico, Oregon, and Colo-  
rado, the laws provide for charges at the same rate per acre. In California and  
Nebraska assessments are on an ad valorem basis, the valuations being alterable,  
if desired, annually. In some of the States some deviation from the usual  
method is permitted, and in most of the States the charges may be imposed  
in a different manner if so provided in contracts with the United States. Fur-  
ther variation can be accomplished by the collection of tolls or charges for  
the water used, these usually being applied only to maintenance and opera-  
tion. Generally speaking, however, the "benefits" or "equal rate per acre"  
plans are inelastic and not easily responsive to the changing producing power  
of the land.

The reclamation act provides for fixing different construction charges for  
different classes of land. This corresponds to the "benefits" plan and is  
equitable if values do not change materially. However, as one of the investi-  
gators stated in his report, "no soil expert or agriculturist has sufficient  
knowledge to forecast the ability of lands to produce crops or the relative value

of such crops as may be adapted to lands of different character." On the project relative to which the investigator was reporting an attempt was made to forecast values and to equalize irrigation assessments by graduating construction charges between \$60 and \$125 per acre. However, the investigator forecasts that this plan is sure to result in requests by settlers on land with a high construction assessment for a reduction in the charge where the land fails to produce the higher returns anticipated.

The simplest method of assessing irrigation charges is, of course, at a uniform rate per acre. In some districts the production value of the land is sufficiently near to uniformity to justify it. In general, however, this plan will not prove satisfactory, because inequitable; nor will the so-called "benefits" plan for the reason stated.

The advisers believe that the most nearly satisfactory method of assessing irrigation costs on the Federal projects is the ad valorem plan followed in California and Nebraska, or the Washington plan by which benefits are determined annually; and that the principle of the ad valorem assessment, adjustable from year to year as productive values of the land change, should be embodied in future Federal projects to the extent that this is found practicable under existing laws or under such amendments as it is found feasible to obtain. The ad valorem basis has one drawback, however, which should be guarded against in using the principles on Federal projects, viz, that under it factors other than productivity of the land, such as location, may be given undue weight in fixing values. In practice California has largely avoided this difficulty.

In following the ad valorem plan of levying assessments California irrigation districts vary widely in their practice. The district law provides that all land shall be valued for purposes of district assessment at its full cash value, but this is not strictly adhered to. There is, however, an attempt to conform to the spirit of this provision. The important point is that each year the districts are enabled to arrive at a fair and reasonable apportionment.

For instance, Tullock irrigation district values land for purposes of district assessment at about 40 per cent of its cash value, about half of the area being valued at \$100 to \$125 per acre. Poor agricultural land is reduced to \$20 to \$40 per acre. In Merced irrigation district average good farm land is valued for purposes of district assessment at \$150 per acre, or at \$200 per acre if adjacent to the city of Merced; land above the gravity system and requiring an extra pumping charge at \$20 per acre, and swamp land at \$10 per acre. South San Joaquin irrigation district follows a geographical zoning system around the principal centers, with valuations in the zoned area ranging from \$105 to \$125 per acre. Beyond the zoned area it is \$100 per acre for good farm land. Land damaged by high-water table is reduced to \$20 per acre. In all of these instances the valuations may vary from year to year as changing the valuations, there is a very close approach to an equitable charge, whether conditions warrant. Thus, when the assessment rate for the year is applied to the valuations, there is a very close approach to an equitable charge, whether based solely on productive value, or also in part on nearness to a center or some other factor that goes to determine the proper proportion of the total cost each landowner is to pay.

The above specific examples from California are given to show the possibilities of the ad valorem plan in arriving at an equitable apportionment of irrigation costs. None of the California irrigation districts are on Federal reclamation projects, but the method would be equally applicable if they were.

Besides its recommendation that new Federal projects adopt the nearest practicable approach to the ad valorem basis of assessment, the advisers urge that wherever at all feasible existing contracts or laws be revised in that direction where the present basis of assessment is very clearly unfair and uneconomic, as most strikingly found in Orchard Mesa irrigation district. If entire substitution of the ad valorem plan is not feasible through radical change in the irrigation district law, it is believed that the contracts with the United States can be made to provide, not only that the original apportionment of construction costs shall be based on productive land value, but also that the apportionment may be changed from year to year to the extent needed to make the charges equitable. The irrigation district boards, acting if necessary with a representative of the Secretary of the Interior or the Bureau of Reclamation, would be entirely competent to make this adjustment. This could amount to an annual revaluation if necessary. This revaluation would auto-



matically take care of desirable variation in maintenance and operation charges, provided this could not more easily be accomplished by the imposition of annual water tolls.

#### SETTLEMENT

From the beginning the Reclamation Bureau has recognized that settlement is an essential corollary of its work. In the early years, however, it was thought possible to take settlement for granted, once the water supply was forthcoming. With the passage of time it has become more and more evident that the problem of settlement is one of crucial importance. The subsidy involved in interest-free construction costs is unduly magnified by delayed or unsuccessful settlement; the revolving fund is tied up too long, with consequent injustice to other possible projects; the social and general economic advantages anticipated from reclamation become belated, and above all, settlers who enter early upon a project suffer from lack of cooperation, leadership, schools, roads, local markets, and everything else that goes with a fully developed community. It is now recognized as doubtful policy for the Government to inaugurate new projects unless it has full assurance of prompt settlement.

In most projects the early stages have been marked either by inadequate settlement or by settlement by persons ill equipped by experience and resources for the undertaking. Since the adoption of the selective-settlement principle, the public lands in the projects have been open only to those who are fitted by experience and character to succeed and are equipped with a modicum of capital, but private lands within the projects may still be conveyed to those without capital or the needed personal qualifications.

Under the selective-settlement plan an applicant for a public-land unit must be in good health; he must be experienced in farm work; and he must possess a capital in cash or equipment of \$2,000. These would have been extremely high qualifications in humid land settlement. For the development of raw land under irrigation the capital requirement is too low. Only with rare good luck and at a heavy cost in time and privation can a man pull through if he can command no greater cash resources than \$2,000. Some settlers are able to borrow additional resources from friends; some survive the lean years of first settlement by employment off the farm. Exceptional cases apart, the minimum on which an irrigated farm unit can be developed without excessive loss of time is cash or reasonably cheap credit amounting to \$5,000. On this point there is universal agreement among those conversant with conditions on the projects. It is also universally agreed that even the settler who can command cash or credit of \$5,000 has still abundant hardships before him to test his quality. His farm will not be fully equipped and 100 per cent productive until he has increased his capital equipment to \$7,500 or \$10,000.

It is impracticable to raise the cash capital requirement to \$5,000. Indeed, the number of applicants for farm units who have as much as \$2,000 is small. Accordingly successful settlement must depend upon the availability of credit funds. Unless the Government is assured that the settler on a new project can find credit on easy terms to the amount of approximately \$3,000, in addition to a cash capital of \$2,000 of his own, the project should not be launched.

Among the first settlers on a project, however carefully selected, some will prove unfitted to succeed or will be defeated by failing health or other misfortune. In a project which has been fully settled it is usually possible for the unsuccessful to dispose of their holdings without material loss. In a half-settled project the chances are correspondingly less. The settler on a project which is being slowly developed incurs risks of this character, for which he has no corresponding gain.

A final consideration here is that unless settlement is carried through energetically at the outset, it is entirely possible that a project otherwise capable of succeeding may fail. The early settlers work under a grave handicap. They have to get on without schools, roads, and other necessities of community living. They become discouraged and fail to develop cooperative relations and leadership. The burden of water charges rests on them heavily; one gives up and then another, still further increasing the burdens on those who hold out. If the general economic position of the project is sound, it will no doubt recover in the end, but only after wholly unjustifiable losses to the original settlers and a wasteful postponement of repayment on the Government's investment.

The problem of settlement is paramount, and any further development of reclamation ought to wait upon its solution.

## CONTROL OF SETTLEMENT OF PRIVATE LANDS

Much of the land within existing projects is in private hands, often in the hands of nonresident speculators, who may feel that to plant an ill-equipped settler who will at any rate level some part of the land and start other improvements before he gives up in despair, is better than leaving the land idle, subject to water charges. When the settler gives up and turns the land back it may be planted again with another settler, who may carry improvement farther. But such a procession of failures is extremely injurious to the morale of the community.

Not only are settlers who are foredoomed to failure often induced to buy private lands; those who have the requisite minimum amount of capital are often induced to use it up in acquiring the land at a speculative value not justified by its actual productivity. Such speculative activity, though common throughout economic life and usually permissible, is highly undesirable in a reclamation project, where it stands squarely in the path of the Government's chief purpose, the building of a sound community.

Under the contracts with the private landowners in the Vale and Owyhee projects every owner is required to sell at an independently appraised valuation any excess over the 160 acres he may select for himself. If the land is not sold within three years after water is available, the Secretary of the Interior may order it sold at the appraised price. Moreover, the owners of less than 160 acres have agreed that if their lands are sold, one-half of any advance of price over its appraised value as undeveloped land goes to the project and is credited to water charges against the land. All value increments on sale are to be shared between the seller and the project up to the point where construction charges against the land have been extinguished. If such a policy had been in force throughout the history of reclamation, not only would land have been cheaper to the working settler but obligations to the Government which still occasion much murmuring would have been wholly extinguished.

## THE CREDIT PROBLEM

The cash and credit needs of a settler in a reclamation project vary, naturally, with the type of agriculture. In any case, however, the settler must have a team of horses, a wagon, and a satisfactory equipment of farm machinery; he must have at least a shack to shelter his family and wind-proof sheds for his livestock. Moreover, he must have the means of subsistence through the period which he will have to devote to clearing away sagebrush, leveling, ditching, etc. In the first year the land will produce little beyond a few vegetables from the garden and a small amount of forage. Even in the second year it will not produce enough for a living, unless it can be provided with livestock.

It is plain that the expenditure of \$5,000, spread over two years, would barely suffice for the essentials of successful settlement. Since most settlers have little more than \$2,000 in cash or its equivalent, they must either secure credits, aggregating \$3,000, or they must devote most of their time to paid jobs off the farm, working up a few acres on their farms at odd times. Meantime water charges are accumulating against them even for the land which remains under sagebrush, making the position of the owner extremely precarious.

From a general economic point of view, there would be no grave risk in supplying the settler with the credit needed to supplement his own capital of \$2,000, assuming that the loan is judiciously administered and confined strictly to productive purposes.

These considerations have, however, only a theoretical bearing on the actual situation. Whether the risk is small or great, credit for such purposes is not available locally. Mortgage loans are not to be had on unpatented lands, and even patented project lands are viewed with suspicion by institutions lending on mortgage, on account of what amounts to a prior lien against the land—Government construction charges. Local banks may lend for short terms, usually at 8 to 10 per cent, on chattels, for financing a cash crop, like sugar beets, or for carrying cattle or sheep through the fattening process. These possibilities are of small relevance to the new settler, who has few chattels to mortgage, no cash crop in sight nor any surplus forage and grain for fattening stock. What he chiefly needs is a three to five year loan, with a reasonably low interest and moderate rates of amortization. Such loans are not to be had under present conditions.

Bills have been introduced in Congress authorizing the setting apart of reclamation funds for loans to settlers, not to exceed \$3,000 for any one farm unit. While such a provision would be desirable in principle, grave doubts have been expressed as to its practicability. It was feared that the settler would become imbued with the feeling that he had a right to a loan of \$3,000 upon entering upon his holding; that what he did with the money was his own affair. It was also feared that the Reclamation Bureau would find itself hampered in its proper work by the obligation to administer the loan fund.

That there is some basis for such fears is recognized by the investigators. The supplying of improvement credit to settlers necessarily involves some risk of loss. But the lack of a supply of improvement credit involves the Government, the State, the project as a whole, and the individual settlers not only in risk, but in certain loss.

The Government suffers losses from write-offs that would not be necessary if the project were developed vigorously from the start. The State loses the tax revenues that would flow from a fully developed project and from the attendant development of adjacent grazing lands and project towns. The project as a whole suffers losses from charges that must be fixed at a level high enough to make up for delinquencies; it suffers further from the depreciation of all land values that attends an uncertain and potentially excessive burden of water charges. The individual settler loses much valuable time in arriving at full production and economic independence.

In view of these considerations none of the parties concerned can afford to take the position that no arrangements should be made for the supply of improvement credit unless all risk can be eliminated. Risk or no risk, the necessary credit is essential to the successful operation of Federal reclamation under present conditions. The practical problem is how to reduce the risk to a minimum.

#### A RECLAMATION CREDIT INSTITUTION

The credit situation on reclamation projects presents a number of features that distinguish it from the usual rural credit situation.

First, the Federal Government, through the reclamation fund, has a pecuniary interest in seeing that settlers are supplied with sufficient credit for successful operation. If credits are unavailable, settlement is slow, failures and consequent delinquencies are numerous, demands for extension of the time for repayment of construction charges and for write-offs are insistent and often successful, to the prejudice of the reclamation fund.

Second, the arid-land States have a direct interest, in so far as they seek extension of existing projects or the launching of new projects. More than two-thirds of the funds available for reclamation are derived from payments made by existing projects. Prompt settlement and successful operation means an increasing flow of funds for the extension of reclamation.

Third, the whole body of settlers on a project, not merely those in need of credit, are directly interested. The principle of joint liability for water charges makes the success of every settler a practical concern of every other settler. If half the settlers on a project fail, the burden of charges on the other half is doubled.

Fourth, the Government's claim upon project lands for the repayment of construction charges is usually regarded by private lending institutions as a prior lien, impairing the security of any loan on the land. It may be true, and in the great majority of cases it is true, that the supplying of water adds more to the real value of the land than the charge assessed against it. Therefore, there should be no inherent insecurity in a lien junior to the construction charges, if the lien is held by the Government, which has the power of enforcing collections along with water charges.

In view of these considerations it follows that reclamation agriculture needs a special form of credit institution; one in which the Federal Government, the State, and the project share in the obligation to supply loanable capital and in the risk involved.

It is of the utmost importance that the risk should be reduced to a minimum, since nothing would more surely demoralize a reclamation project than the loose handling of loan funds. An inevitable result of an easy-going administration of loans would be an insatiable demand for credits, to be followed in time by a demand for the cancellation of debts.

The safeguards upon which a reclamation credit institution would have to depend are:

(1) Limitation of amount that might be loaned to any one person and on any one farm unit. The limit should not exceed \$3,000.

(2) No loan to any settler who does not have \$2,000 in cash, equipment, or equity.

(3) Loans to be granted exclusively for productive purposes, such as the purchase of materials for the construction of barns, fences, for well digging, clearing and leveling land, purchase of breeding stock.

(4) Credits to be supplied, not in a lump sum, but *pari passu* with improvement, and generally representing not more than two-thirds of the value of the improvement. Thus if the cost of building, etc., were estimated at \$30 an acre, the settler would be entitled to a credit of not more than \$20 for each acre leveled.

(5) Applications for credit should be investigated by a local committee, consisting of representatives of the Reclamation Bureau, the settlers, and an agricultural adviser; but the actual decision to grant or withhold credit should rest with an official trained in banking, appointed by a central reclamation credit institution.

(6) The project and the State should participate in the supply of loanable funds, in order to insure a local sentiment favorable to a sound credit policy.

(7) All loans should carry an amortization feature, and should run for such period, in each instance, as would suffice under good management for payment in major part or in full.

The management of such credit institution should be centralized, in order to reduce overhead to a minimum while commanding expert banking service. So far as the supply of funds is concerned, each project should stand on its own feet.

In a new project the party most interested is the Federal Government, which has invested its capital in anticipation of settlement; the party next most interested is the State, which is looking forward to a gain in population and wealth. There is at the outset no definite project interest. Accordingly the loanable funds for a new project should be advanced by the reclamation fund and the State, with the provision, however, that a certain percentage be added to construction charges, for the gradual retirement of reclamation fund advances. This percentage should be so calculated as to insure the complete return of such advances with the completion of construction payments, leaving the project credit institution entirely under the control of the project and the State.

In the case of projects already partly settled and organized as irrigation districts the establishment of a branch credit institution would have to depend on voluntary acceptance by the project of the obligation of raising a fair proportion of the necessary funds through charges levied on the same basis as construction.

Interest received on loans would go to project, State and Federal Government in proportion to the funds supplied.

It would be desirable to permit any project to apply funds raised in anticipation of construction charges to the acquisition from the Government of shares in the credit institution, with the privilege, in an emergency, of applying such shares to construction charges. This would offer the project a safe interest-bearing investment for surplus funds, and would encourage early payment of construction charges.

While the project credit institution should at first be confined to the requirements of settlement and development, it should be sufficiently flexible to undertake the general business of a rural credit institution, once the project has paid off all its obligations to the Government. Because of the joint liability for upkeep and operation of irrigation works, project settlers have a permanent need of a credit institution adapted to their requirements.

It is recognized that the establishment of a reclamation loan institution would temporarily tie up some part of the reclamation fund that might otherwise be used for new projects. The total improvement credit requirement of each project would not, however, be large. When a new project is launched, the progress of settlement is gradual. If 200 units are thrown open for settlement, it is improbable that more than 50 will be occupied the first year and an equal number each succeeding year until all are taken. The first year the average improvement credit requirement should not exceed \$1,500, or \$75,000 in the aggregate. The second year would require an additional \$150,000 and the third and fourth years the same amount. The fifth year would require \$75,000.

Thus, at the end of five years the credit outstanding on the project would amount to \$600,000, assuming that every settler could establish his need of the maximum loan permitted. This sum may be compared with the construction cost, which for a project of this size could hardly be less than \$1,500,000, and might easily amount to \$2,000,000.

In the actual working out of the plan, however, no project would ever require such a maximum. A project developing vigorously from the outset would attract many settlers with sufficient capital of their own to get on without loans. Moreover, the loans granted in the first year would in part be repaid by the fifth year. It is probable that no project would have outstanding at any one time more than one-half of the possible maximum, or from 15 to 20 per cent of the project costs. If the State provided one-third of the capital, the reclamation fund would be drawn upon only to the extent of between 10 and 15 per cent of the construction costs.

That an offsetting sum would shortly be returned to the Government through accelerated construction payments hardly requires argument. Under the 40-year payment plan a project costing \$1,500,000 should pay, when fully settled, \$37,500 a year. Such a credit scheme would undoubtedly hasten full settlement by at least five years. Moreover, the demands for moratoria and write offs, which arise inevitably under present circumstances to the prejudice of the reclamation fund, would be quieted.

#### SETTLEMENT AND AGRICULTURAL ADVISERS

To be fully successful not only should a project be settled promptly with farmers who command the requisite minimum of cash capital or credit, but its settlers should also have at their command the best available advice on such matters as the selection of land and equipment, purchase of livestock, preparation of land for irrigation, the selection of crops and methods of irrigation, agricultural practice and farm management. Many of the settlers on new projects are without practical experience in irrigation farming. They do not know how to select land suited to their peculiar needs, how to clear and level it with the minimum of labor and cost, how to run the farm laterals to distribute water most economically. Even farmers experienced in irrigation in other communities frequently encounter new conditions of soil, climate, marketing, and the like, requiring readjustments of practice. Their need of technical advice is only less urgent than that of the farmers who are gaining a first acquaintance with irrigation.

Most of the existing projects are located in counties in which a representative of the agricultural extension service is maintained. These extension representatives are rendering valuable assistance as far as they can. Their activities are, however, so many and spread over such a large territory that it is impossible for them to give to project settlers the attention they need.

A few of the projects have been receiving additional assistance from the office of demonstration or reclamation projects, a Federal office in the Department of agriculture, but here again, because of a lack of finances, the work can not be extended to all the projects needing it. The demonstration office cooperates with the State extension service in the employment of additional workers who are assigned to the Federal reclamation projects. The salaries of the workers are paid in part or in full by the demonstration office and the balance of the salary and the expenses by the State extension service. A further handicap in extending this work is that the funds to carry it on must be obtained from the county in which the project is located, which sometimes refuses or is unable to provide them. A much more satisfactory plan would be to have the entire salary and expenses taken care of by the State and Federal Governments. It is all important to the success of the projects that the extension demonstration work should be more adequately provided for financially.

The need of adequate provision for a continuous service of this character becomes apparent when the character of the irrigation community is contrasted with that of a humid land agricultural community. In the latter each farmer stands on his own feet. If his agricultural practice is bad and he goes bankrupt, the misfortune is chiefly his own. A competent man can prosper in the midst of a community that is decaying. The irrigation community, in contrast, is bound together permanently by the common service and expense of the water supply. Unsuccessful farmers who fall delinquent in their charges may threaten the prosperity of the competent ones. It is therefore of extreme importance that the Reclamation Bureau at the outset, and the State later, should

make satisfactory provision for expert advice. In launching new projects the bureau should make arrangements in advance for the participation of the State in the supplying of technical advice and for its assumption of more extended responsibility later.

At the initial stage, while the project is largely unsettled and settlers are coming in, the provision of technical advisers might properly be treated as a function of the Reclamation Bureau. It is integrally related to successful settlement. To assist in establishing a profitable agriculture at the earliest possible moment is to abbreviate the period that must elapse before full construction charges can be met. Even from a narrow business point of view it would be good policy for the bureau to supply each new project with a full-time agricultural agent.

For psychological reasons it is desirable that the salary of such agent should be paid out of the general funds of the bureau, not charged upon the project, as logic might appear to require. The position of the adviser in the community would be weakened if his salary appeared to be a direct burden on it. Moreover, if the plan of a credit institution suggested above were in operation, the agricultural agent would necessarily play an important part in determining whether applications for loans were to be approved. He should therefore be in a position quite independent of local influence.

The need for technical advice would continue to be pressing after settlement had been completed and the Reclamation Bureau agent transferred to another project. Provision for such advice should be arranged for in advance by agreement with the State and local officials, and with the Department of Agriculture. What would be required would be merely the extension and regularization of arrangements which already exist.

#### STATE PARTICIPATION IN RECLAMATION ACTIVITIES

Reclamation under the national reclamation act has proceeded with little cooperation on the part of the States having projects within their borders. These States have given no formal authorization for such projects nor have they assumed any responsibility for their construction, settlement, and operation.

The whole effort at reclamation down to the present has been a cooperative enterprise between the Federal Government and the settlers, with the expectation that construction, operation, and maintenance costs incurred by the Government would all be repaid by the settlers. Thus the whole cost and labor of reclamation rests ultimately on the settler, except in so far as the advances of construction costs on an interest-free basis represents a subsidy from the Government. The settler has received little help from the owners of lands adjacent to his project whose holdings are increased in value and whose operation is stabilized by his efforts, or from the communities whose volume of trade he is increasing, or from the county to which his project brings a better balanced industry, increased valuation for taxation, better educational, and social conditions. Neither has he received organized help, other than through the agricultural extension service, from the State which benefits through increased production, greater volume of business, and increased valuation. All are interested in his success, none has assumed any financial obligation to assist him in his efforts.

This appears the more remarkable when an attempt is made to measure the benefits from reclamation to locality and State. As a general rule, holding throughout the progressive parts of the world, every agricultural community maintains an equally populous nonagricultural community. Every unit of agricultural capital gives an impetus to the formation of a nonagricultural capital of twice its own magnitude. The development of a project of 200 farms means ultimately for the State an increase of 1,000 in the agricultural population and an equal increase in the population of towns and cities. It means an increase in taxable agricultural capital of \$2,000,000 and an increase in non-agricultural capital of \$4,000,000. Thus it would be eminently worth while for any State to make pecuniary sacrifices, if necessary, to promote reclamation within its boundaries.

There is, however, a more potent reason why the States should assume an active part in reclamation activities. Under the American system of government there is no such direct relation between the Federal Government and the local community, as there must necessarily be between the State and the local



community. The project settlements come into relation with the Federal Government only incidentally to its public-land policy. This relation lapses as soon as the lands have all been settled and construction payments have been completed. Eventually every project settlement will have to look to the State for the laws and regulations essential to its existence; for the creation of financial institutions suited to its needs; for special agricultural advice other than such as the Department of Agriculture can supply to all rural communities through the country.

It follows that the States ought to participate in reclamation activities from the beginning, in order that whatever experience the Reclamation Bureau may accumulate may be shared with the State authorities who are ultimately to assume full responsibility. This participation ought to be in some measure pecuniary. Some part of the cost of every new project ought to be borne by the State; some part of the construction repayments ought to go to the State. Such a pecuniary interest would go far toward giving a realistic direction to State participation. It is realized by the advisers that the States are limited by their own constitutions in the measure of the debt they can create for reclamation or other purposes, but amendments of State constitutions are frequent and could be made for this purpose if the people so desire. The present constitutional provisions regarding the allowable indebtedness of the Western States, and also statistics regarding their population, wealth, revenues, expenditures, and bonded debt are in the appendix.

For projects already undertaken, State participation in construction is out of the question; but State participation in establishing appropriate credit institutions is entirely practicable. It may be argued that the arid land States are too limited financially to carry a share of the pecuniary burdens of reclamation. They have found it quite possible, however, to carry a share of the burdens of road building. It is doubtful whether the net gain from gasoline and other motor taxes add more to the State revenues, proportionally, to cost of improvements, than the increase in property taxes made possible by reclamation.

An additional reason for State financial participation lies in the potential rivalry among the several States in the disposition of the reclamation funds. So long as projects are financed entirely from such funds, every State has a motive to employ political influence in securing for itself the maximum number of projects, irrespective of their economic value. The principle of financial participation would serve as a brake upon immoderate and unwise demands.

The States should certainly be expected to take part in what may be described broadly as educational work in connection with the projects. In recent years there has been a rapid development of State agencies for the aid of agriculture; State boards for assistance in colonization, land-settlement boards, livestock inspection, dairy commissions, horticultural commissions, organizations for the control of pests, etc. State appropriations for the support of agricultural experiment stations and colleges of agriculture have steadily increased. The extension service in agriculture and home economics, in which the county, the State, and the Federal Government cooperate, has developed immensely since the passage by Congress in 1914 of the agricultural extension act, commonly known as the Smith-Lever Act. These developments have all been of great benefit to farmers on reclamation projects, but in view of the special assistance that is being rendered by the Federal Government, they should recognize their obligation to give Federal reclamation projects some additional consideration.

It is suggested here that—

(1) For existing projects, a memorandum of agreement should be negotiated and adopted for each project, providing for the fullest cooperation with the Bureau of Reclamation of all State and local agencies for agricultural, industrial, and social betterment.

(2) For new projects, binding contracts should be executed in advance, providing for the joint assumption by the United States and by the State in which the project is located of the financial and other responsibilities for construction, settlement, operation, and maintenance.

#### RESPONSIBILITY OF THE UNITED STATES UNDER WARREN ACT CONTRACTS

The Warren Act was approved February 21, 1911. Seventy-seven contracts have been entered into under this act, these involving a total contract value to June 30, 1929, of \$7,514,521. Repayments due under these contracts to the same

date amounted to \$5,333,519, of which all but \$72,190, or about 1.3 per cent of the amount due, has been paid. In one case, involving nearly \$2,000,000, the money was contributed to the Government in advance.

This record of repayments under the Warren Act is indeed remarkable when the number of contracts that are involved is borne in mind. Repayments called for range from a few hundred to over \$2,000,000. Thirty-nine of the contracts are under the Minidoka project, with only 1 in arrears; 17 are under the Yakima project, with 1 delinquent; 10 are under the North Platte project, with 3 delinquent; 6 are under the Bolse project, with none in arrears; and 4 are under Klamath project, of which 3 are behind.

The Warren Act is supplemental to the reclamation act. Its purpose is to enable so-called private projects to obtain surplus water available on Federal reclamation projects or to make use of surplus carrying capacity in Federal project canals. It authorizes the Secretary of the Interior to cooperate with irrigation districts and other agencies or individuals in the construction of works for the impounding and delivery of such surplus water.

In spite of the very fine showing made by the Warren Act projects in the matter of repayments to the Government, a few of them are not in good financial condition due to causes with which the United States has been in no way connected. There has, therefore, arisen in the minds of the advisers question as to whether the United States can properly be charged with any moral or other responsibility for the success of such projects, other than that specifically set forth in the individual contracts entered into under the act. The question seems to the advisers to have a bearing on the general Federal reclamation program.

Obviously it would be unfair to attempt to transfer to the United States direct responsibility for the success of private projects which it has sought to assist under the provisions of the Warren Act. The responsibility for success clearly lies with the private project so long as the United States carries out the obligations imposed upon it under its contract. This, in the opinion of the advisers, can not be made too emphatic. Furthermore, under any fair interpretation of the law, the United States is not bound to go beyond ordinary business prudence in complying with requests for assistance under its terms. Nevertheless, it appears to the advisers that the United States will accomplish its largest usefulness under the Warren Act if it exercises the same caution in accepting Warren Act contracts as it exercises in undertaking strictly Federal projects. Entirely apart from whether the Government should exercise this caution in order to protect its own investment, the advisers believe it to be desirable for two distinct reasons, viz, these projects need to have applied to them the same strict tests of feasibility which the Bureau of Reclamation is now seeking to apply to its own projects; and if the Warren Act projects fail, the United States, whether fairly or unfairly, is charged in the minds of the public with at least some moral responsibility and the general reclamation program suffers accordingly. In addition, settlers on Warren Act projects are very likely to be induced to purchase land because the Government is a participating agency.

Basing its conclusions on the above reasoning the advisers offer the following specific recommendations:

(1) That no Warren act project be accepted by the Government which does not stand the strict test of feasibility which it is sought to impose on Federal projects.

(2) That construction by agencies seeking assistance under the Warren act be carried out under sufficient Government supervision to insure a satisfactory standard of work.

(3) That the financing of the project which is to receive the assistance be satisfactory to the Secretary of the Interior.

The advisers realize that such a policy as is outlined above for Warren act projects will add greatly to the already heavy burdens of the Bureau of Reclamation. Nevertheless they feel it is a desirable policy. They believe that it will not only result in withholding aid to infeasible or premature projects, but that, in the case of projects that can be successfully carried out if soundly planned and effectively supervised, it will strengthen the general program and further help to confine Federal aid to communities which may have some proper claim to it.



## FEDERAL AID TO IRRIGATION DISTRICTS AND OTHER PRIVATE PROJECTS

During recent years formal and informal requests for Federal aid have been received by the Bureau of Reclamation from a large number of privately organized irrigation projects. In some cases the projects were already in financial difficulty; in others new work needed could not be financed by local credit. Many other projects equally entitled to consideration would have made similar requests had the Government entered this field as a general policy.

It is true that many of the existing Federal reclamation projects or divisions of Federal projects were originally started as some form of private enterprise, and that a number of these had failed prior to receiving Government aid. It has been in only a few cases, however, that the private project taken over was not related in some degree to a larger reclamation plan than that previously begun. Many of the recent requests for Federal aid are from private enterprises in no way related to existing Federal projects. While only two such projects—Palo Verde Irrigation district in California and Bitter Root Irrigation district in Montana—have come before the advisers, the need for some general policy for dealing with such cases is apparent.

The original conception of Federal reclamation as first authorized by Congress was that it should primarily be applied to the arid public lands. While large areas of public lands have been reclaimed under the reclamation act, the benefits of the act have by no means been so limited. On the contrary, some of the best of the Federal projects have primarily reclaimed private lands. Private speculation has not been controlled to the extent desirable, but, generally speaking, public aid to settlers on private projects has greatly benefited the communities and States in which such aid has been extended, and the major purpose of the reclamation act has thus been furthered. The essential thing is that large areas of unused land have been brought into production and a new basis for agricultural and industrial development brought to many Western States and communities. And in accomplishing this, Federal aid on privately organized projects has been fully justified.

The advisers, therefore, believe that the operations of Federal reclamation thus far furnish a proper basis and a satisfactory precedent for considering the granting of assistance to worthy private enterprises that are independent of strictly Federal projects. But it is clear that all the requests that are made can not be granted, even if they might otherwise be justified, because of lack of the necessary funds, unless, of course, Congress shall make appropriations therefor outside of the reclamation fund. In any event before aid of this nature is extended, Congress should adopt aid to private districts as a general policy which should apply to all projects that meet the general requirements that are set forth. If Congress adopts this new policy and provides the needed funds, the advisers are of the opinion, and so recommend, that the following general principles should apply in passing on requests for Federal aid of the class referred to:

- (1) The project should be susceptible of development into an economically sound enterprise, and any private obligations which would load the project with a debt the land could not carry, in addition to repaying the Government advances, should be liquidated or canceled before any Federal obligation whatever is assumed. If this is not insisted on, the Government aid will very largely work out primarily for the benefit of the creditors rather than for those who farm the land.

- (2) The cost of rehabilitating the project, including the amount due private creditors and not liquidated or waived, should be substantially greater than that on similar private projects that have succeeded or are succeeding. In other words, the advisers believe that the money which is furnished by the Government should not be used except in cases where desirable projects could not be carried through without it. The purpose of Government aid should be to equalize the burdens of reclamation as between the different projects and different communities.

- (3) The Government should not take over outstanding project bonds.

- (4) Satisfactory provision should be made for controlling speculative increases in land values which result from the Government aid. Increments in land value should, in the event of sale, in part go to reduce the construction debt, as provided in the Owyhee, Vale, and Kittitas project contracts.

(5) That when Government aid is extended to private projects of the class above referred to, the money advanced by the Government should bear interest.

In conclusion, the advisers are of the opinion that the Federal Government should not enter the field of rehabilitating or otherwise extending aid to private-reclamation projects in a way that will break down or supersede local efforts. No action should be taken by the Federal Government which will result in a feeling that the United States stands ready to take over all of the troubles of private reclamation, or which will place feasible private projects which carry their own costs in full at a disadvantage.

In the opinion of the advisers, the proper function of Federal reclamation is to supplement but not replace reclamation by district and other local agencies. They believe that the Government should enter the field of reclamation only where the reclamation load is heavier than the States and the various communities can carry, and only where the leadership and the assistance of the Government are needed to carry through comprehensive conservation projects. In their judgment, district and other private projects should be taken over by the Government only when and if they can qualify under the policy above outlined. Even if this rather strict plan is adhered to, however, there will still be opportunity for aid to be extended to those districts that tie in naturally with Federal projects, either under the Warren Act or otherwise, which possess the requisites for success.

#### PROJECT WOMEN AND HOME CONDITIONS

Reclamation farming is not the work of men alone, but is a partnership enterprise in which women are a necessary part; and in order to understand and solve the problems of reclamation it is necessary to know how reclamation, as it is now carried on, affects the well-being of wives and mothers.

On the older projects many years of steady industry have brought prosperous agriculture; and many well equipped, attractive homes are the result. In the earlier years, however, the houses and farm buildings are usually unpretentious structures. Optimism and enthusiasm prevail almost universally in all the project homes, and most of the settlers endure hardships willingly when they see the possibility of ultimate success that the future promises them. The fact that some of the older project settlers have been able to build homes with every convenience and comfort that the finest city homes afford, proves to them that such achievement is possible. To attain it both men and women exert every effort which will bring about more rapid development.

A few of the women who are better versed in the work and life on a farm, participate in some form of economic activity which affords an additional income to that provided by the usual crops and livestock. By the sale of eggs and chickens, and frequently of turkeys, geese, bees, and garden produce, they add substantial sums to the family income. Efforts of this kind go far toward making a farm enterprise successful.

A number of the women preserve fruits and vegetables for winter use, and a few cold-pack meats. Activities such as these provide variety for winter diet and safeguard the good health of the family. But diet lists and food properties are as a rule not subjects of common knowledge; and many of the women have not had the time or opportunity to obtain such information, though they recognize its value. Nor is food preservation and winter storage as universally practiced as would be possible and profitable.

The social and community life which is a feature of the older projects develops slowly in the newer communities. During this formative period representative project groups of either men or women are seldom brought together. Active cooperative bodies are as a rule not to be found in these early stages, although in even the minor and comparatively limited field of women's economic interests there would be considerable advantage and benefit through cooperation.

Social interests for project women have been developed to a somewhat greater degree through church organizations, women's club activities, and the like. Good roads, automobiles, the radio, and the telephone are also doing their part to eliminate the loneliness and isolation of farm life. The 4-H clubs for boys and girls, the chief means by which the benefits of both instruction and social contact for young people are now attained in some farming communities, are

well organized on many of the Federal projects. The interest shown in the crop and livestock clubs by the boys, and in the sewing, canning, and home planning clubs by the girls of those projects which have the advantage of club leadership, is strong recommendation for extending the work to other projects.

A worker with training similar to that of home-demonstration agents in home and community leadership could aid the women in many ways to achieve greater efficiency in their household processes. Child care, diet lists, sewing, preserving, and cold-pack processes are a few of the topics in which the women need and desire instruction. Hints on kitchen arrangement and equipment are eagerly sought. Such homely things as the plans and placing of cupboards for the greatest convenience, the advantages of certain articles of home equipment especially suited to farm needs, the determination of appropriate color schemes for rooms to be refinished, these and many other problems arise daily in a community the size of a reclamation project, and there is frequently no qualified person to whom the women may turn at the present time for advice and assistance.

A properly trained worker could individually aid many women with their several problems, and by arranging for project or community club gatherings could bring persons particularly qualified in these or other fields of endeavor to address and instruct the women. Far-reaching benefits affording more general project improvement might be expected to accompany such a home worker's efforts. The present marketing conditions, which the women who enter actively into the work of selling some of the farm produce feel are inadequate, should be benefited by cooperative organizations. Church and school needs would be more keenly felt and more capably dealt with; and with the development of an active community spirit, a community center, so greatly needed on all the projects, would be realized.

But while the women of the projects are greatly in need of constructive leadership the settlers themselves should not have to bear the cost of placing such workers on the projects. This direction should be provided by the Federal Government, the State governments, or by the two agencies acting in cooperation. Fully as great as the benefit to the settler resulting from an expenditure of this kind would be the benefit to the Federal Government and to the States.

The process of changing the arid West into improved irrigated farms is work for courageous, determined, and intelligent men and women. The women's work which assists this transformation is equally as vital and demanding as that of the men, for it is largely the attitude which the homemaker and mother maintains toward farm life and the project community that determines whether or not the undertaking will succeed.

Theodore Roosevelt, knowing the social significance of Federal reclamation, stated the ideal which should guide future reclamation policies when he said: "Our aim should be not simply to reclaim the largest area of land and provide homes for the largest number of people but to create for this new industry the best possible social and industrial conditions."

---

#### APPENDIX

##### PERTINENT FACTS CONCERNING PROJECTS INCLUDED IN ECONOMIC SURVEY OF RECLAMATION

In the accompanying table an attempt has been made to bring together the principal economic and financial data relating to the projects investigated, which have been classified under the heads of Federal projects, private projects aided by the Government, private projects purchasing water or power from the Government, private projects requesting aid from the Government, and one Indian project.

Complete data on all subjects included in the table are not available from the reports of the investigators, but it is believed that at least a general picture of conditions can be obtained from the statistics furnished. Some of the figures represent the best estimate that could be made from incomplete data.

Pertinent facts concerning projects included in economic survey of reclamation, 1929—Continued

Character of project, division of project, or irrigation district, and name	Irrigable acreage		Irrigated acreage, 1928	Cropped acreage, 1928	Estimated crop values, 1928		Estimated irrigated farms			Total amount to be repaid to United States on construction account	Total repaid to June 30, 1929, on construction account	Plan of repayment	Estimated annual charge per acre		General taxes per acre	Amount owing creditors other than United States	Cost of additional construction requested or refinancing	Annual rainfall (inches)	Length of growing season (days)
	On completion	Under existing works			Per acre	Total	Total	Operated by owners	Operated by tenants				Construction	Operation and maintenance					
FEDERAL																			
Belle Fourche, South Dakota.	80,310	74,500	35,910	46,700	\$1,173,370	\$25.13	876	331	545	\$5,432,258.07	\$552,811.91	40-year	\$1.20	\$1.25	10	\$1.50		14.5	141
Milk River, Malta and Glasgow divisions, Montana.	87,788	72,455	15,830	34,920	402,585	11.53	382	196	186	5,012,010.00	(1)	do	1.42	1.50	16			12.9	133
Milk River, Chinook division, Montana.	55,500	43,950	22,360	22,360	473,190	21.16	125	73	52	750,000.00	(1)	20-year	.75	1.90	13	.50-.85	\$515,917		
Sun River, Greenfields division, Montana.	93,031	41,975	7,860	30,540	465,910	15.26				9,534,807.06	(1)	40-year crop production, crop production.	2.50	.85	22	40.00-60.00		10.9	130
Lower Yellowstone, Montana-North Dakota.	59,349	58,260	19,770	36,650	708,250	19.33	632	293	339	4,164,248.92	152,177.72	do	1.50	1.10	13			14.9	124
Umatilla, east and west divisions, Oregon.	22,431	18,730	11,305	11,040	242,740	21.98	456	274	182	2,095,778.94	374,911.97	do	1.85	1.75	16	1.00-1.98		7.9	199
Owyhee (excluding Oregon-Idaho).	104,000	22,000	17,600	17,600		40.00	307			18,000,000.00	(1)	40-year	14.00	1.50	14	2.00-3.00		9.0	150
North Platte, Northport division, Nebraska.	16,175	16,175	11,780	11,240	235,960	20.99	194	68	126	1,112,695.48	12,516.23	Crop production.	1.05	1.40	12	1.00-1.75	+40,000	14.7	132
Shoshone, Willwood division, Wyoming.	11,930	11,930	1,160	1,100	10,960	9.93	41	41		1,372,200.00	(1)	40-year		1.25	12			5.6	122
Riverton, Wyo.	100,000	20,000	580	520	6,670	12.95	14	12	2	3,850,570.00	(1)	do		1.00	8				
PRIVATE, AIDED BY GOVERNMENT																			
Grand Valley, Orchard Mesa irrigation district, Colorado.	10,000	10,000	6,200	6,000	750,000	10.25	00			999,768.00	28,901.72	20-year	2.90	3.10	5	1.50-6.00	4,200	8.3	183
King Hill, Idaho.	16,888	8,000	6,525	6,230	176,620	28.33	185	120	65	1,489,968.94	(11)	Crop production.	1.70	5.00	20	2.00		9	186

Emmett irrigation district, Idaho.	23,000	19,500	18,768	18,768	44.00	350	200	805,680.00	39,305.60	20-year	1.25	2.00	2.30-3.30	1,665,400	40,000	13.7	177
PRIVATE, PURCHASING WATER OR POWER																	
Shasta View Irrigation district, Oregon.	3,856	3,200	1,230	1,230	14.132	11.49		131,104.00	(1)	40-year	1.70	2.90	.30-.90	118,654	63,104	10	146
Malin Irrigation district, Oregon.	3,479	3,479	1,499	1,499	13.446	8.97		118,292.80	1,774.41	do.	3.42	2.28	.30-.90	81,100		10	146
Horseshy Irrigation district, Oregon.	10,432							154,136.31	13,209.72	20-year, 40-year	2.35	1.73		122,600	285,600	10	146
Stanfield Irrigation district, Oregon.	8,360	3,427	2,981	2,981	96.862	32.50	115	695,000.00	(1)	20-year		6.00	1.89-2.83	84,500	641,000		
Westland Irrigation district, Oregon.	10,500	8,000	4,000	2,900		50		1,023,750.00	(1)	do.	2.25	1.25	1.00	87,500		8	180
Gem Irrigation district, Idaho.	10,000	10,000	13,000	13,000	41.50							7.50	2.00-3.00	1,000,000	1,000,000	13	175
PRIVATE, REQUESTING AID FROM GOVERNMENT																	
Bitter Root Irrigation district, Montana.	20,000	20,000	14,694	14,694	660.023	44.92	418			30 years, at per cent.	2.80	2.20		699,000	754,144	15	160
Palo Verde Irrigation district, California.	89,693	65,000										15.00	2.25-2.60	4,259,330	(1)		

1 Payment commences 1932.

2 Contracts being negotiated.

3 Payments commence upon notice by Secretary.

4 Completed system lends (approximately 42,000 acres) repay construction on crop production basis. Uncompleted system lands (approximately 51,000 acres) repay construction on 40-year basis (80 semiannual payments).

5 420 of 632 farms were irrigated.

6 Project under construction.

7 Paid to United States only and does not include bonded indebtedness.

8 Under construction; water rental.

9 Contract being negotiated.

10 Usual gross return in general farming area of district ranges from \$30 to \$60 per acre.

11 None.

12 Water rental period 10 years.

13 Payment commences 1936.

14 211 of 418 farms are held by non-resident owners.

15 Take over levels and refund amount expended.

*Reclamation States: Population, wealth, revenue, expenditures, and bonded debt*

State	Population (1928)	Taxable wealth (1922)	Public revenue (1927)	Public expenditures (1927)	Bonded debt (1927)
Arizona.....	474,000	\$1,158,000,000	\$7,710,000	\$7,544,000	\$2,833,000
California.....	4,556,000	14,050,000,000	88,945,000	111,530,000	110,125,000
Colorado.....	1,090,000	2,860,000,000	16,348,000	16,147,000	11,643,000
Idaho.....	546,000	1,258,000,000	8,161,000	8,832,000	5,367,000
Montana.....	549,000	1,990,000,000	8,780,000	8,196,000	5,613,000
Nebraska.....	1,408,000	5,128,000,000	17,287,000	20,221,000	None.
Nevada.....	77,000	441,000,000	4,062,000	3,831,000	1,842,000
New Mexico.....	396,000	737,000,000	6,999,000	8,148,000	3,870,000
North Dakota.....	641,000	2,167,000,000	19,428,000	19,088,000	33,356,000
Oregon.....	902,000	3,059,000,000	22,955,000	22,070,000	65,563,000
South Dakota.....	704,000	2,744,000,000	16,338,000	16,388,000	60,500,000
Texas.....	5,487,000	9,453,000,000	78,687,000	70,774,000	4,002,000
Utah.....	531,000	1,361,000,000	11,062,000	10,430,000	9,660,000
Washington.....	1,587,000	4,696,000,000	35,622,000	34,755,000	10,200,000
Wyoming.....	247,000	650,000,000	8,824,000	7,701,000	1,909,000

## ALLOWABLE INDEBTEDNESS UNDER CONSTITUTIONS OF IRRIGATION STATES

*Arizona.*—The following provisions of Article IX of the constitution of Arizona relate to the matter of allowable indebtedness which Arizona may incur:

"SEC. 5. The State may contract debts to supply the casual deficits or failures in revenues, or to meet expenses not otherwise provided for; but the aggregate amount of such debts, direct and contingent, whether contracted by virtue of one or more laws, or at different periods of time, shall never exceed the sum of \$350,000; and the money arising from the creation of such debts shall be applied to the purpose for which it was obtained, or to repay the debts so contracted, and to no other purpose.

"In addition to the above limited power to contract debts the State may borrow money to repel invasion, suppress insurrection, or defend the State in time of war; but the money thus raised shall be applied exclusively to the object for which the loan shall have been authorized or to the payment of the debt thereby created. No money shall be paid out of the State treasury, except in the manner provided by law."

"SEC. 7. Neither the State, nor any county, city, town, municipality, or, other subdivision of the State shall ever give or loan its credit in the aid of, or make any donation or grant, by subsidy or otherwise, to any individual, association, or corporation, or become a subscriber to or a shareholder in any company or corporation or become a joint owner with any person, company, or corporation, except as to such ownerships as may accrue to the State by operation or provision of law."

*California.*—Section 1, Article XVI of the constitution of California, provides as follows:

"The legislature shall not, in any manner, create any debt or debts, liability or liabilities, which shall, singly or in the aggregate with any previous debts or liabilities exceed the sum of three hundred thousand dollars, except in case of war to repel invasion or suppress insurrection, unless the same shall be authorized by law for some single object or work to be distinctly specified therein, which law shall provide ways and means, exclusive of loans, for the payment of the interest of such debt or liability as it falls due and also to pay and discharge the principal of such debt or liability within seventy-five years of the time of the contracting thereof, and shall be irrevocable until the principal and interest thereon shall be paid and discharged and such law may make provision for a sinking fund to pay the principal of such debt or liability to commence at a time after the incurring of such debt or liability of not more than a period of one-fourth of the time of maturity of such debt or liability; but no such law shall take effect until, at a general election, it shall have been submitted to the people and shall have received a majority of all the votes cast for and against it at such election; and all moneys raised by authority of such law shall be applied only to the specific object therein stated or to the payment of the debt thereby created, and such law shall be published in at least one newspaper in each county, or city and county, if one be published therein, throughout the State, for three months next preceding the election at which it is submitted to the people. The legislature may, at any time after the approval of such law by the people, if no debt shall have been

contracted in pursuance thereof, repeal the same." (As amended November 3, 1908.)

*Colorado.*—The part of section 3 of Article XI of the constitution of Colorado, that is material in connection with the present purposes, reads as follows, the quotation being from section 3 as amended December 21, 1922 (Session Laws of Colorado, 1923, p. 234):

"The State shall not contract any debt by loan in any form, except to provide for casual deficiencies of revenue, erect public buildings for the use of the State, suppress insurrection, defend the State, or, in time of war, assist in defending the United States; and the amount of debt contracted in any one year to provide for deficiencies of revenue, shall not exceed one-fourth of a mill on each dollar of valuation of taxable property within the State, and the aggregate amount of such debt shall not any time exceed three-fourths of a mill on each dollar of said valuation, until the valuation shall equal \$100,000,000, and thereafter such debt shall not exceed \$100,000; and the debt incurred in any one year for erection of public buildings shall not exceed one-half mill on each dollar of said valuation; and the aggregate amount of such debt shall never at any time exceed the sum of \$50,000 (except as provided in section 5 of this article [debt for public buildings]), and in all cases the valuation in this section mentioned shall be that of the assessment last preceding the creation of said debt."

*Idaho.*—Sections 1 and 2 of Article VIII of the constitution of Idaho provide as follows:

"SECTION 1. *Limitation on public indebtedness.*—The legislature shall not in any manner create any debt or debts, liability or liabilities, which shall singly or in the aggregate, exclusive of the debt of the Territory at the date of its admission as a State, and exclusive of debts or liabilities incurred subsequent to January 1, 1911, for the purpose of completing the construction and furnishing of the State capitol at Boise, Idaho, and exclusive of debt or debts, liability or liabilities incurred by the eleventh session of the Legislature of the State of Idaho, exceed in the aggregate the sum of \$2,000,000, except in case of war, to repel an invasion, or suppress an insurrection, unless the same shall be authorized by law, for some single object or work to be distinctly specified therein, which law shall provide ways and means, exclusive of loans, for the payment of the interest on such debt or liability as it falls due and also for the payment and discharge of the principal of such debt or liability within 20 years of the time of the contracting thereof, and shall be irrevocable until the principal and interest thereon shall be paid and discharged. But no such law shall take effect until at a general election it shall have been submitted to the people, and shall have received a majority of all the votes cast for or against it at such election, and all moneys raised by the authority of such laws shall be applied only to specified objects therein stated or to the payment of the debt thereby created, and such law shall be published in at least one newspaper in each county or city, and county, if one be published therein, throughout the State for three months next preceding the election at which it is submitted to the people. The legislature may at any time after the approval of such law, by the people, if no debts shall have been contracted in pursuance thereof, repeal the same.

"Sec. 2. *Credit of State shall not be given or loaned.*—The credit of the State shall not, in any manner, be given, or loaned to, or in aid of any individual, association, municipality, or corporation; nor shall the State directly or indirectly become a stockholder in any association or corporation."

*Montana.*—Section 2 of Article XIII of the constitution of Montana reads as follows:

"Sec. 2. The legislative assembly shall not in any manner create any debt except by law which shall be irrevocable until the indebtedness therein provided for shall have been fully paid or discharged; such law shall specify the purpose to which the funds so raised shall be applied and provide for the levy of a tax sufficient to pay the interest on, and extinguish the principal of such debt within the time limited by such law for the payment thereof; but no debt or liability shall be created which shall singly, or in the aggregate with any existing debt or liability, exceed the sum of \$100,000 except in case of war, to repel invasion or suppress insurrection, unless the law authorizing the same shall have been submitted to the people at a general election and shall have received a majority of the votes cast for and against it at such election."

*Nebraska.*—Section 1 of Article XIII of the constitution of Nebraska reads as follows:

"SECTION 1. *State may contract debts—limitation.*—The State may, to meet casual deficits, or failures in the revenues, contract debts never to exceed in the aggregate



gate \$100,000 and no greater indebtedness shall be incurred except for the purpose of repelling invasion, suppressing insurrection, or defending the State in war; and provision shall be made for payment of the interest annually, as it shall accrue, by a tax levied for the purpose, or from other sources of revenue, which law providing for the payment of such interest by such tax shall be irrevocable until such debt be paid."

*Nevada.*—Article 9, section 3, of the constitution of Nevada, as amended in 1916, reads as follows:

"350. SEC. 3. The State may contract public debts; but such debts shall never in the aggregate, exclusive of interest, exceed the sum of 1 per cent of the assessed valuation of the State, as shown by the reports of the county assessors to the State controller, except for the purpose of defraying extraordinary expenses, as hereinafter mentioned. Every such debt shall be authorized by law for some purpose or purposes, to be distinctly specified therein; and every such law shall provide for levying an annual tax sufficient to pay the interest semiannually, and the principal within twenty years from the passage of such law, and shall specially appropriate the proceeds of said taxes to the payment of said principal and interest; and such appropriation shall not be repealed nor the taxes postponed or diminished until the principal and interest of said debts shall have been wholly paid. Every contract of indebtedness entered into or assumed by or on behalf of the State, when all its debts and liabilities amount to said sum before mentioned, shall be void and of no effect, except in cases of money borrowed to repel invasion, suppress insurrection, defend the State in time of war, or, if hostilities be threatened, provide for the public defense."

*New Mexico.*—Sections 7 and 8 of Article IX of the constitution of New Mexico provide as follows:

"*Debt-contracting power of State.*—SEC. 7. The State may borrow money not exceeding the sum of \$200,000 in the aggregate to meet casual deficits or failure in revenue or for necessary expenses. The State may also contract debts to suppress insurrection and to provide for the public defense.

"*Debt-contracting power of State—How exercised—Limitation.*—SEC. 8. No debt other than those specified in the preceding section shall be contracted by or on behalf of this State unless authorized by law for some specified work or object, which law shall provide for an annual tax levy sufficient to pay the interest and to provide a sinking fund to pay the principal of such debt within fifty years from the time of the contracting thereof. No such law shall take effect until it shall have been submitted to the qualified electors of the State and have received a majority of all the votes cast thereon at a general election; such law shall be published in full in at least one newspaper in each county of the State, if one be published therein, once each week for four successive weeks next preceding such election. No debt shall be so created if the total indebtedness of the State, exclusive of the debts of the Territory and the several counties thereof assumed by the State, would thereby be made to exceed 1 per centum of the assessed valuation of all the property subject to taxation in the State as shown by the preceding general assessment."

*North Dakota.*—Section 182 of the constitution of North Dakota, as amended March 18, 1924 (Session Laws 1925, p. 329), reads as follows:

"The State may issue or guarantee the payment of bonds, provided that all bonds in excess of \$2,000,000 shall be secured by first mortgage upon real estate in amounts not to exceed one-half of its value; or upon real and personal property of State-owned utilities, enterprises, or industries, in amounts not exceeding its value: *And provided further,* That the State shall not issue or guarantee bonds upon property of State-owned utilities, enterprises, or industries in excess of \$10,000,000.

"No further indebtedness shall be incurred by the State unless evidenced by a bond issue, which shall be authorized by law for certain purposes, to be clearly defined. Every law authorizing a bond issue shall provide for levying an annual tax, or make other provision, sufficient to pay the interest semiannually, and the principal within thirty years from the date of the issue of such bonds and shall specially appropriate the proceeds of such tax, or of such other provisions to the payment of said principal and interest, and such appropriation shall not be repealed nor the tax or other provisions discontinued until such debt, both principal and interest, shall have been paid. No debt in excess of the limit named herein shall be incurred except for the purpose of repelling invasion, suppressing insurrection, defending the State in time of war or to provide for the public defense in case of threatened hostilities."

Adopted March 18, 1924—64,996 to 57,345.



*Oregon.*—Section 7 of Article XI of the constitution of Oregon provides as follows:

*"Credit of State not to be loaned—limitation upon power of contracting debts—permanent roads.*—The legislative assembly shall not lend the credit of the State nor in any manner create any debt or liabilities which shall singly or in the aggregate with previous debts or liabilities exceed the sum of \$50,000, except in case of war or to repel invasion or suppress insurrection or to build and maintain permanent roads; and the legislative assembly shall not lend the credit of the State nor in any manner create any debt or liabilities to build and maintain permanent roads which shall singly or in the aggregate with previous debts or liabilities incurred for that purpose exceed 2 per cent of the assessed valuation of all the property in the State; and every contract of indebtedness entered into or assumed by or on behalf of the State in violation of the provisions of this section shall be void and of no effect." [Constitution of 1859, sec. 7 of Art. XI (L. O. L., p. 122); initiative amendment approved by the people at the general election held November 5, 1912 (L. 1913, p. 8).]

*South Dakota.*—Sections 1 and 2 of Article XIII of the constitution of South Dakota read as follows:

"SECTION 1. For the purpose of developing the resources and improving the economic facilities of South Dakota, the State may engage in works of internal improvement, may own and conduct proper business enterprises, may loan or give its credit to, or in aid of, any association, or corporation, and may become the owner of the capital stock of corporations, organized for such purposes. But any such association or corporation shall be subject to regulation and control by the State as may be provided by law. No money of the State shall be appropriated, or indebtedness incurred for any of the purposes of this section, except by the vote of two-thirds of the members of each branch of the legislature. The State may also assume or pay any debt or liability incurred in time of war for the defense of the State. The State, or any county, or two or more counties jointly, may establish and maintain a system of rural credits and thereby loan money and extend credit to the people of the State upon real estate security in such manner and upon such terms and conditions as may be prescribed by general law. The limit of indebtedness contained in section 2 of this article shall not apply to the provisions of this section, but the indebtedness of the State for the purposes contained in this section, other than for rural credits, shall never exceed one-half of 1 per cent of the assessed valuation of the property of the State.

"SEC. 2. For the purpose of defraying extraordinary expenses and making public improvements, or to meet casual deficits or failure in revenue, the State may contract debts never to exceed with previous debts in the aggregate \$100,000 and no greater indebtedness shall be incurred except for the purpose of repelling invasion, suppressing insurrection, or defending the State or the United States in war, and provision shall be made by law for the payment of the interest annually, and the principal when due, by tax levied for the purpose or from other sources of revenue; which law providing for the payment of such interest and principal by such tax or otherwise shall be irrevocable until such debt is paid: *Provided, however,* The State of South Dakota shall have the power to refund the Territorial debt assumed by the State of South Dakota, by bonds of the State of South Dakota."

*Texas.*—Sections 49, 50, and 52 of Article III of the constitution of Texas read as follows:

"SEC. 49. No debt shall be created by or on behalf of the State, except to supply casual deficiencies of revenue, repel invasion, suppress insurrection, defend the State in war, or pay existing debt: And the debt created to supply deficiencies in the revenue, shall never exceed in the aggregate at any one time \$200,000.

"SEC. 50. The legislature shall have no power to give or to lend, or to authorize the giving or lending, of the credit of the State in aid of, or to any person, association or corporation, whether municipal or other, or to pledge the credit of the State in any manner whatsoever, for the payment of the liabilities, present or prospective, of any individual, association of individuals, municipal or other corporation whatsoever.

"SEC. 52. The legislature shall have no power to authorize any county, city, town, or other political corporation or subdivision of the State to lend its credit or to grant public money or thing of value [value] in aid of, or to any individual, association, or corporation whatsoever, or to become a stockholder in such corporation, association, or company: *Provided, however,* That under legislative provision any county, any political subdivision of a county, any number of

adjoining counties, or any political subdivision of the State, or any defined district now or hereafter to be described and defined within the State of Texas, and which may or may not include towns, villages, or municipal corporations, upon a vote of two-thirds majority of the resident taxpayers voting thereon who are qualified electors of such district or territory to be affected thereby, in addition to all other debts, may issue bonds or otherwise lend its credit in any amount not to exceed one-fourth of the assessed valuation of the real property of such district or territory, except that the total bonded indebtedness of any city or town shall never exceed the limits imposed by other provisions of this constitution, and levy and collect such taxes to pay the interest thereon and provide a sinking fund for the redemption thereof, as the legislature may authorize, and in such manner, as it may authorize the same, for the following purposes to wit:

"(a) The improvement of rivers, creeks, and streams to prevent overflows, and to permit of navigation thereof or irrigation thereof, or in aid of such purposes.

"(b) The construction and maintenance of pools, lakes, reservoirs, dams, canals, and waterways for the purposes of irrigation, drainage, or navigation, or in aid thereof.

"(c) The construction, maintenance, and operation of macadamized, graveled, or paved roads and turnpikes, or in aid thereof." (Sec. 52, art 3, adopted election November 8, 1904; proclamation December 29, 1904.)

*Utah.*—Section 1 of Article XIV of the constitution of Utah reads as follows:

"SECTION 1. *State debt limitations.*—To meet casual deficits or failures in revenue, and for necessary expenditures for public purposes, including the erection of public buildings, and for the payment of all Territorial indebtedness assumed by the State, the State may contract debts, not exceeding in the aggregate at any one time, an amount equal to 1½ per centum of the value of the taxable property of the State, as shown by the last assessment for State purposes, previous to the incurring of such indebtedness. But the State shall never contract any indebtedness, except as in the next section provided, in excess of such amount, and all moneys arising from loans herein authorized, shall be applied solely to the purposes for which they were obtained." (As amended November 10, 1910.)

*Washington.*—Sections 1 and 2 of Article VIII of the constitution of the State of Washington read as follows:

"1. *Limitation of State debt.*—The State may, to meet casual deficits or failure in revenues or for expenses not provided for, contract debts, but such debts, direct and contingent, singly or in the aggregate, shall not at any time exceed \$400,000, and the moneys arising from the loans creating such debts shall be applied to the purpose for which they were obtained, or to repay the debts so contracted, and to no other purpose whatever.

"2. *Powers extended in certain cases.*—In addition to the above limited power to contract debts, the State may contract debts to repel invasion, suppress insurrection, or to defend the State in war, but the money arising from the contracting of such debts shall be applied to the purpose for which it was raised, and no other purpose whatever."

*Wyoming.*—Sections 1 and 2 of Article XVI of the constitution of Wyoming read as follows:

"SECTION 1. *Public indebtedness—Limitation of State debt.*—The State of Wyoming shall not in any manner create any indebtedness exceeding 1 per centum on the assessed value of the taxable property in the State, as shown by the last general assessment for taxation, preceeding; except to suppress insurrection or to provide for the public defense.

"SECTION 2. *Creation of State debt restricted.*—No debt in excess of the taxes for the current year shall in any manner be created in the State of Wyoming, unless the proposition to create such debt shall have been submitted to a vote of the people and by them approved; except to suppress insurrection or to provide for the public defense."

## APPENDIX

### REPORTS OF INVESTIGATORS IN ECONOMIC SURVEY OF CERTAIN FEDERAL AND PRIVATE IRRIGATION PROJECTS, 1929

Following are the reports of the investigators in the economic survey of certain Federal and private irrigation projects, 1929, on which is based the report of the special advisers discussed at this hearing.

These reports are arranged, as nearly as possible, in the order in which they are discussed in the report of the special advisers, as follows:

Belle Fourche project, South Dakota, by F. C. Youngblutt, superintendent, and W. J. Burke, district counsel.

Chinook division, Milk River project, Montana, by L. H. Mitchell, superintendent, Shoshone project, Wyoming.

Northport division, North Platte project, Nebraska-Wyoming, by Dr. Alvin Johnson, associate editor, Encyclopedia of Social Sciences, New York, N. Y.

Umatilla project, Oregon.

East division (Hermiston irrigation district), by H. J. Ott, E. L. Jackson, F. L. Jewett, T. W. Botkin, and New Madden.

West division (west extension irrigation district), by A. C. Houghton, manager.

Hermiston, west extension, Westland, and Stanfield irrigation districts, by H. K. Dean, superintendent, experiment station, Hermiston; L. R. Breithaupt, extension economist, Oregon State College; G. R. Hyslop, agronomist, Oregon State College experiment station; and Prof. W. L. Powers, chief of soils, Oregon State College.

Westland irrigation district, Oregon, by P. W. Dent, assistant commissioner; George C. Kreutzer, director of reclamation economics (died November 23, 1929); B. E. Stoutemyer, district counsel; and E. B. Debler, engineer, Bureau of Reclamation.

Stanfield irrigation district, Oregon, by P. W. Dent, assistant commissioner; George C. Kreutzer, director of reclamation economics (died November 23, 1929); B. E. Stoutemyer, district counsel; and E. B. Debler, engineer, Bureau of Reclamation.

Emmett irrigation district, Idaho, by W. W. Johnston, associate reclamation economist; and B. E. Stoutemyer, district counsel, Bureau of Reclamation.

King Hill irrigation district, Idaho, by B. E. Stoutemyer, district counsel, and W. W. Johnston, associate reclamation economist, Bureau of Reclamation.

Orchard Mesa irrigation district, Grand Valley project, Colorado, by Prof. Frank Adams, college of agriculture, University of California.

Shasta View and Malin irrigation districts, Klamath project, Oregon, by Prof. Frank Adams, college of agriculture, University of California.

Horsefly irrigation district, Oregon, by William F. B. Chace, secretary.

Gem irrigation district, Idaho, by B. E. Stoutemyer, district counsel and W. W. Johnston, associate reclamation economist, Bureau of Reclamation.

Bitter Root irrigation district, Montana, by George O. Sanford, superintendent, Sun River project, Montana.

Palo Verde irrigation district, California, by Ed. F. Williams, George W. Scott, and L. A. Hauser.

Malta and Glasgow divisions, Milk River project, Montana, by L. H. Mitchell, superintendent, Shoshone project, Wyoming.

Greenfields division, Sun River project, Montana, by H. H. Johnson, superintendent, Milk River project, Montana.

Lower Yellowstone project, Montana-North Dakota, by George O. Sanford, superintendent, Sun River project, Montana.

Riverton project, Wyoming, by Dr. Alvin Johnson, associate editor, *Encyclopedia of Social Sciences*, New York, N. Y.

Willwood division, Shoshone project, Wyoming, by B. E. Hayden, reclamation economist, Bureau of Reclamation.

Owyhee project, Oregon-Idaho, by A. C. Cooley, senior agriculturist, Department of Agriculture, in charge of demonstrations on reclamation projects; Rhea Luper, State engineer of Oregon; Prof. W. L. Powers, chief of soils, Oregon State College; and L. R. Breithaupt, extension economist, Oregon State College.

Duck Valley irrigation project, by A. C. Cooley, senior agriculturist, Department of Agriculture, in charge of demonstrations on reclamation projects; Prof. W. L. Powers, chief of soils, Oregon State College, and Rhea Luper, State engineer of Oregon.

Table of acreage and value of crops, 1928 and 1929, on Federal reclamation projects.

Table of status of construction account repayments, June 30, 1929.

## BELLE FOURCHE PROJECT, SOUTH DAKOTA

(By F. C. Youngblutt, Superintendent, and W. J. Burke, District Counsel)

### HISTORY OF THE PROJECT

1. *Irrigable area.*—Construction of the Belle Fourche project began in 1905 after two years of preliminary surveys and studies. The first unit was opened June 21, 1907, and irrigation began in a limited way the following year. Construction continued and succeeding units were opened from time to time up to the public notice of January 9, 1917, which opened the fifth unit and brought the total irrigable area to 81,841 acres. This area has been reduced by classes 5 and 6, land, and other eliminations, so that water charges are now being collected on 61,800 acres. Forty-six per cent of the project lands were homesteaded after water became available; 53 per cent were private lands; and 1 per cent were State school lands.

2. *Charges for construction and operation and maintenance.*—Stock subscriptions were executed by most of the private landowners before construction began and in this way the lands were pledged for repayment of the costs. Four thousand and one hundred acres held by recalcitrant owners were not obligated in any way until the irrigation district was organized under the State law in 1923, which forced these noncomplying lands to share in the benefits of irrigation. Lands under the first and second units were given a construction rate of \$30 per acre, those in the third and fourth units a rate of \$40 per acre, and those in the fifth unit a rate of \$45 per acre. The operation and maintenance charge has varied from \$0.40 per acre, which prevailed for several years after the project was opened, to \$2 per acre in 1920. In recent years this charge has varied from \$1.25 to \$1.60 per acre. Under the readjustments of 1923 and 1927 the lands assumed a higher construction rate because of unpaid operation and maintenance charges and deficits being compounded with construction and also because of additional construction for drainage and other improvements. In 1923 an average of about \$14 per acre was added to the construction account and in 1927 about \$18 per acre additional was added.

3. *Relief granted.*—The original plan of 10 annual construction payments met with collection difficulties from the first and in 1911 relief was granted whereby the first three annual installments were reduced and compounded with later payments. Further reduction in payments were permitted, provided the land owner agreed to an increase in construction charge from \$30 to \$35 per acre.

The extension act of 1914 extended the time to 20 years and permitted unpaid operation and maintenance charges to be compounded with construction. Under this act the land owners as a rule were meeting their obligations and collections were fairly satisfactory until the agricultural depression of 1920 brought about a collapse in the value of farm products and also in project repayments. At this time the construction installments on most of the project land amounted to 6 per cent or \$1.80 to \$2.40 per acre and operation and maintenance had climbed to \$2 per acre. These charges together with general taxes brought the overhead to about \$6 per acre and delinquencies were inevitable under the existing methods of general farming and under the prevailing market depression that brought in very little returns above operating expenses.

From 1921 to 1925, inclusive, water was delivered to project farms under various congressional relief measures and collections during this period were

negligible. Crop returns for these years had an average value of \$12.10 per acre as compared to a maximum of \$34.65 in 1919 and \$25.13 per acre under the rehabilitation conditions of 1928.

4. *Contract of 1923.*—The formation of the Belle Fourche irrigation district was completed in 1923 and contract with United States signed on July 16, which had for its purpose a better local working organization and funding of delinquent charges so that individual accounts were cleared and farms became temporarily eligible for water service through this plan. The contract embodied the following principal provisions:

(a) The district assumed a construction deficit of \$870,500 and operation and maintenance deficit of \$89,384.

(b) Construction installments amounting to \$331,676 and operation and maintenance installments amounting to \$396,831 for 1920, 1921, and 1922 were transferred to supplemental construction account to be paid after the 20-year period of primary charges.

Collections under the district plan were in the hands of the county officers and water charges took the same status as general taxes. This, however, proved of no avail and soon after the funding, delinquencies again became burdensome so that early in 1926 Congress proposed abandonment and sale of the Belle Fourche project. This brought a stir from the local people and organizations in the valley and in cooperation with the Reclamation Bureau, concerted efforts were directed toward saving the investments in the irrigation works and in the project lands.

5. *Contract of 1927.*—A new contract negotiated between the irrigation district and United States was signed and approved October 4, 1927, but became operative with the irrigation season of 1926. This required that operation and maintenance charges be paid in advance of water service which had the effect of stimulating collections and in the spring of 1926 the district made its first substantial payment to United States amounting to \$44,000. Other principal provisions of the contract were as follows:

(a) No construction charges to be levied 1926 to 1928, inclusive.

(b) Delinquent operation and maintenance charges funded with primary construction.

(c) Time for paying primary construction extended to 40 years from date of water-right application.

(d) Supplemental construction charges payable over 20 years beginning at the end of the 40-year period of primary charges.

(e) District to advance \$40,000 in 1926, \$50,000 in 1927, and \$60,000 in 1928 before water could be delivered and to meet all operating expenses thereafter.

(f) United States to provide \$1,000,000 for a project drainage system, \$150,000 for replacement of certain major temporary structures and \$30,000 for aid in settlement and economics.

(g) District to assume operation and maintenance and care of the project December 31, 1933.

The terms of this contract have thus far been fulfilled by the district to the letter, and local sentiment favors the utmost support for this agreement, which it is considered gives the project liberal treatment and an opportunity to make a new start under better farming conditions and reduced annual water payments. It is apparent, however, that certain disturbing features pertaining to settlement and production will affect the district's ability to meet its contracted obligations. The need of more settlers, building improvements, and extension of intensive farming prompt this report, with a view of enlisting support in the solution of the economic problems that confront the project.

#### PRESENT ECONOMIC CONDITIONS

6. *Early settlement.*—Present economic difficulties can be traced to the lax settlement policy under which the project lands were entered. Five hundred and eighty public-land farm units were homesteaded largely by people who had no foundation for an agricultural life, and who as a rule did not intend to become farmers. These entrymen, consisting of business and professional men, clerks, and tradesmen, lacked not only the necessary capital to develop an irrigated farm but were unsuited to the trials and hardships of a pioneer's life. The result was that the homesteader, after obtaining title, moved away from the land and became a nonresident owner or permitted the holding to pass into the hands of mortgage companies and other owners under financial distress. These farms are

still undeveloped, lack building improvements and in many cases are rented on terms that barely cover the taxes and water charges.

7. *Rehabilitation efforts.*—The rehabilitation efforts of the past few years beginning in 1926 recognized the need of settlement, farm improvements, new industries, more intensive crops, and publicity for the project. Options were secured on 95 nonresident owned farms which were offered for sale at prices considered reasonable by the Reclamation Bureau. Most of these farms could be purchased on the basis of 10 per cent down and balance payable in semiannual installments over 20 years. These listings were published in a project booklet issued by the Government in 1927 which also set out farming opportunities and other information concerning the project. This booklet has been sent to all parts of the country in answer to inquiries.

8. *Farm occupancy.*—An associate reclamation economist was employed on the project from May, 1927, to December, 1928, for the purpose of giving special attention to sale of farms, securing building improvements, better agriculture, and industrial development. About 20 per cent of the listed farms were sold during this period, but only a few of these sales involved new resident owners. The Belle Fourche Commercial Club employed a field agent for several months who worked in the older irrigated regions among well-to-do tenants with the object of selling Belle Fourche project farms. The Chicago & North Western Railway Co. also gave special attention to the settlement of this section through an extensive advertising program in 1928. Results in each case were disappointing, although some increase in tenantry was noticeable, due largely to the building of a sugar factory on the project in 1927. The settlement situation is summarized in the following tabulation:

Year	Number of farms occupied by owners	Number of farms occupied by tenants	Farms not occupied, but farmed	Farms idle	Total number of farms
1922.....	371	169	-----	-----	-----
1923.....	320	182	-----	-----	-----
1924.....	276	178	-----	-----	-----
1925.....	256	178	412	119	965
1926.....	242	207	380	136	965
1927.....	245	251	361	112	969
1928.....	250	259	343	128	980

This shows that the ebb in farm occupancy was reached in 1925, when only 45 per cent of the project farms were occupied. Resident ownership has remained practically stationary but in three years tenants have taken up about 20 per cent of the places that were at one time without resident operators. Lack of habitable buildings on the remaining farms and the beet tenants' aversion to the gumbo soil have been factors retarding the settlement and development of a large part of the project.

9. *Kind of crops.*—Alfalfa and small grain constituted the principal crops under irrigation for many years and industries that would form the basis for more intensive production were entirely lacking. Cucumbers for pickles were first grown in 1925 and during the past four years have returned an average of \$102 per acre. Production of this crop is limited by the pickle company contracts and it is found that about 150 acres will supply the demand. Five salting stations have been established on the project, one in each community, and many farmers grow from one to two acres as a ready cash crop. Sugar beets have been successively grown since 1916, but the acreage of this crop remained unimportant until the sugar factory was erected at Belle Fourche in 1927. This industry has served to rehabilitate farming on the project, particularly on sandy loam soils, which constitute about one-third of the total acreage. The gumbo soils will produce a heavy tonnage of beets, but the difficulty of working the crop has retarded the extension of beet growing in these areas. In 1928 the average yield of beets for the project was 12.1 tons while the heavy soils of the Arpan district produced an average of 11.7 tons, indicating that this soil is entirely suited to beet growing. A total of 6,000 acres of beets were grown on the project in 1927, and since that time the increase has been at the rate of 1,000 acres per year with a corresponding rise in the annual crop values per acre.

The following statistics furnish information on kind of crops, acreage and returns:

	Acre alfalfa	Corn and small grain	Acre sugar beets	Acre assessed	Acre cropped	Acre irrigated	Crop returns per acre
1924.....	29,630	14,606	1,281	72,386	49,813	48,400	\$11.98
1925.....	26,331	21,315	1,238	72,031	53,120	48,800	16.79
1926.....	21,640	19,993	2,184	61,205	47,729	36,200	18.40
1927.....	20,500	15,050	6,020	61,587	45,701	26,572	19.93
1928.....	18,200	17,896	6,930	61,829	46,696	35,910	25.13

10. *Industries and other improvements.*—Other developments of recent date include a 12-mile belt spur to the southeast part of the project and seven new beet dumps, all constructed to serve the interests of the sugar factory at Belle Fourche and to induce best growing on project farms. An improved Federal highway was built through the project east and west and one north and south is under construction. Drainage of the seeped lands began in 1928 as part of the rehabilitation program, including about 150 miles of drains of which 30 per cent are already completed. Funds for this purpose are being advanced by United States under the irrigation district contract of October 4, 1927. This new construction work not only serves to reclaim seeped lands but has created in the minds of local people a feeling of confidence in project policies which was lacking following the near collapse of 1926.

11. *Available credit.*—The credit situation is somewhat serious inasmuch as no money is available for real-estate loans. Local banks make short-time loans on cattle, sheep, hogs, or milk cows and will finance the sugar-beet growing to a reasonable extent. The interest rate is 8 to 10 per cent. The Federal Land Bank of Omaha operates very conservatively and will make small loans but only on farms that are already in good production. The Minneapolis Credit Corporation is making loans up to \$1,000 on purchases of productive livestock and a number of project farms have availed themselves of this opportunity.

12. *Action on nonpaying lands.*—The irrigation district was empowered by the last legislature to institute tax-title proceedings against nonpaying lands and arrangements have been perfected for such action. Butte County officials however have become active in the matter and are beginning on a comprehensive program for obtaining title and disposing of land where no effort is made to meet taxes or water charges. About 10 per cent of the project farms will be affected by these proceedings and it is believed that the proposed clean-up will result in benefit to the settlement and development of the farms.

13. *Undeveloped farms a burden.*—Notwithstanding these improvements in production, transportation, industries, farm occupancy and morale, the fact remains that 48 per cent of the farms are still in need of resident operators and that at the present rate of settlement 15 years will be required to bring all the lands into a state of profitable production. While the irrigation district is meeting its contracted obligations and will perhaps continue to do so in substantial proportions, the payments are a burden to the land owners and the district where water charges are not sustained in full by returns from the farms. This situation is dealt with in greater detail in the following analysis of 100 such farms located in the Newell township.

#### ANALYSIS OF 100 UNOCCUPIED FARMS

14. *Farms in township 9-6.*—Township 9 N., R. 6 E. comprises the northeast part of the project and contains a total of 210 farms. One hundred and three of these farms are occupied by owners and tenants while 107 are unoccupied. The latter includes 7 State school land farms, which are not included in the accompanying tabulation. This township is typical of the settlement situation in the gumbo soils although the construction charges are somewhat higher than average on this area because of the relatively late opening of the lands.

15. *Returns and overhead charges.*—It will be noted by reference to the table that these 100 farms in 1928 produced crops valued at \$40,601 or an average of \$406 per farm. General taxes amounted to \$123.85 and operation and maintenance \$83.93 per farm. Construction charges due in 1930 amount to \$74.08 per farm, making a total overhead of \$281.86 or \$5.20 per irrigable acre. This leaves



\$124 per farm for taking care of operating expenses, upkeep, and mortgage debt interest on investment. These statistics are summarized as follows:

Total irrigable area of 100 farms (acres).....	5, 437
Cropped area (acres).....	3, 974
Estimated value of the farms.....	\$252, 000
Crop returns in 1928.....	40, 601
General taxes, 1928.....	12, 385
Overhead and mortgage, 1928.....	8, 394
Construction, 1930.....	7, 409
Total overhead.....	28, 188
Operating expenses, upkeep, and mortgage-debt interest.....	12, 413
Total.....	40, 601

These farms pay an average construction charge of \$1.36 per acre, whereas the average for the entire project is \$1.12 per acre. Mortgage indebtedness has been reduced through foreclosures so that only 13 per cent of these farms are burdened with this form of debt, amounting to a total of \$18,000, or about \$1,500 interest per year. Building improvements are valued at \$13,735, or an average of \$137.35 per farm. In reality 51 farms have no buildings whatever, and only 10 of the farms have habitable quarters.

16. *Farm rentals.*—The majority of the 100 farms analyzed are rented on crop shares on a 50-50 basis. Due to lack of settlers and poor demand a number of the places rent for cash considerations that are below the actual overhead expense, as indicated by the following arrangements for 1929:

Farm No.	Taxes and water charges (no construction)	Cash rent for 1929	Farm No.	Taxes and water charges (no construction)	Cash rent for 1929
1.....	\$148.02	\$150.00	48.....	\$61.67	\$50.00
2.....	403.72	200.00	60.....	242.52	120.00
3.....	151.72	140.00	65.....	261.07	200.00
7.....	114.72	100.00	67.....	189.69	200.00
8.....	284.44	150.00	68.....	285.84	200.00
11.....	222.43	100.00	69.....	250.59	100.00
13.....	281.02	150.00	70.....	310.65	200.00
15.....	169.31	100.00	73.....	272.68	225.00
43.....	134.42	100.00	93.....	203.01	200.00
47.....	118.24	100.00			

17. *Ownership.*—About one-third of the owners reside on or in the vicinity of the project, while two-thirds reside in various parts of United States, as indicated by column 11 of the table. One-third are located more than 500 miles from their project holdings. These farms were acquired by their present owners through the following procedure:

Number acquired through bank failures.....	3
Number acquired through inheritance.....	6
Number acquired through purchase.....	26
Number acquired through mortgage foreclosures.....	31
Number acquired through homestead entry.....	34
Total.....	100

The last two columns of the table show the occupation of the present and original owners. In this list are represented 50 different trades and professions, and although farmers are mentioned most frequently, these are men who are engaged in agricultural pursuits elsewhere.

#### RECOMMENDATIONS

18. *Impetus for development.*—It is believed that development of these farms will be indefinitely delayed unless some new impetus is given to the settlement

and economic features. We recommend that consideration be given to the formation of a local credit corporation, which will have for its object the development of these farms. The activities of the corporation should include settlement, loans for building improvements, and if necessary the control and operation of the farms. Because of the Government's investment and interest in these project lands, we recommend that the United States contribute to the capital stock of such corporation in the amount of 100 per cent of the capital paid in by local interests.

*Crop yield report of Belle Fourche (S. Dak.) project, year 1928*

Crop	Area (acres)	Unit of yield	Yields			Values		
			Total	Per acre		Per unit of yield	Total	Per acre
				Average	Maximum			
Alfalfa hay.....	16,696	Ton.....	26,859	1.6	4	\$8.00	\$214,872.00	\$12.87
Barley.....	3,285	Bushel.....	105,203	32.1	63	.50	52,651.00	16.03
Beet, sugar.....	6,929	Ton.....	83,974	12.1	22	7.25	608,811.00	87.86
Clover hay, sweet.....	111	do.....	101	.9	1.5	6.00	606.00	5.46
Clover seed, sweet.....	31	Bushel.....	136	4.4	33.3	3.00	408.00	13.16
Corn.....	4,560	do.....	90,059	19.7	65	.70	63,011.00	13.82
Corn fodder.....	936	Ton.....	1,476	1.6	5.0	8.00	11,808.00	12.61
Cucumbers.....	144	Bushel.....	15,345	106.5	200	.91	13,968.00	97.00
Garden.....	99					95.30	9,435.00	95.39
Hay, mixed.....	216	Ton.....	264	1.2	2.0	8.00	2,112.00	9.77
Hay, native.....	1,233	do.....	1,039	.8	3.3	8.00	8,312.00	6.74
Oats.....	3,514	Bushel.....	151,252	43.0	100	.35	52,938.00	15.06
Pasture seeded.....	1,820	Acre.....				8.00	14,560.00	8.00
Pasture, native.....	1,053	do.....				4.00	4,212.00	4.00
Potatoes, white.....	164	Bushel.....	19,657	119.9	500	.60	11,794.00	71.91
Speltz.....	294	do.....	9,959	33.9	80.0	.50	4,980.00	16.94
Wheat.....	5,307	do.....	117,451	22.1	50.3	.80	93,960.00	17.70
Miscellaneous.....	304						4,898.00	16.11
Total and average.....	46,696						1,173,366.00	25.13

Areas	Acres	Farms	Per cent of project
Total irrigated area, project proper (includes assessed area).....	74,500	980	192
Total irrigable area farms reported.....	61,885	980	76
Total irrigated area farms reported.....	35,910	876	44
Under water-right applications.....	35,516	867	43
Under rental contracts.....	394	9	1
Total cropped area farms reported.....	46,696	980	57

<sup>1</sup> Based on 81,464 acres ultimate irrigated area of completed project.

## Settlement and economics—Unoccupied farms in Newell Township, Belle Fourche project, South Dakota

Farm No.	Total area	Irrigated area	Acres in cultivation, 1928	Crop returns, 1928	General taxes, 1928	Overhead and mortgage payable 1928	Construction per year beginning 1920		Building improvements		Address of owner	Owner acquired land through—	Occupation of owner	Occupation of original entryman
							year	per year	Kind	Approximate value				
1	80	33.1	22.0	\$240	\$95.07	\$12.95	\$37.55		Menger	\$400	Ottawa, Kans.	Mortgage foreclosure	Druggist	Farmer.
2	200	90.8	60.0	210	238.42	145.30	94.72		Habitable Cabin	600	Newman Grove, Nebr.	do	Banker	Miner.
3	160	25.9	20.0	200	110.27	41.45	33.88		Cabin	50	Sioux Falls, S. Dak.	do	Mortgage collector	Farmer.
4	120	42.3	40.0	250	99.97	67.70	48.20		None	0	Villard, Minn.	Homestead entry	Lumberman	Lumberman.
5	80	50.4	45.0	308	103.50	80.65	68.21		Habitable	700	Newell, S. Dak.	do	Farmer	Farmer.
6	80	53.7	40.0	320	133.98	84.49	86.91		Cabin	100	do	do	Housewife	Lady homesteader.
7	160	41.9	None.	0	47.67	67.05	48.60		do	100	Huntington Park, Calif.	Mortgage foreclosure	Investor	Laborer.
8	120	68.6	5.0	8	174.69	109.75	107.41		Menger	200	Minneapolis, Minn.	do	Mortgage collector	Farmer.
9	80	71.7	40.0	160	162.06	114.70	77.99		Cabin	100	San Diego, Calif.	Purchase	Mechanic	Mechanic.
10	80	67.0	40.0	320	153.30	107.20	90.51		do	100	Pierre, S. Dak.	Bank failure	State of South Dakota.	Lady homesteader.
11	80	58.3	58.0	232	139.13	93.30	85.51		House	600	New Hampton, Iowa	Mortgage foreclosure	Banker	Farmer.
12	80	37.7	12.0	06	83.48	60.30	68.43		Cabin	150	Nowell, S. Dak.	Homestead entry	Clerk	Lady homesteader.
13	160	62.6	None.	0	180.87	100.15	85.32		Habitable	1,000	Lead, S. Dak.	Mortgage foreclosure	Banker	Do.
14	160	55.4	12.0	96	177.01	88.65	82.01		None	0	Point Loma, Calif.	do	Investor	United States employee.
15	80	41.4	30.0	300	103.06	66.25	54.59		do	0	Newell, S. Dak.	do	Real estate	Farmer.
16	120	77.1	63.0	360	223.19	123.35	61.70		Habitable	1,000	Pierre, S. Dak.	do	State of South Dakota.	Cleaner and dyer.
17	160	30.5	31.0	412	122.64	48.80	45.42		None	0	Newell, S. Dak.	Homestead	Rancher	Farmer.
18	70	54.6	46.0	594	119.04	87.36	82.47		do	0	Lead, S. Dak.	do	Mechanic	Mechanic.
19	160	74.7	70.0	560	101.69	119.50	101.96		Menger	400	Sioux Falls, S. Dak.	Mortgage foreclosure	Mortgage collector	Farmer.
20	160	65.0	40.0	186	176.49	104.01	131.39		None	0	Urbana, Ill.	Homestead	Teacher	Student.
21	160	62.6	53.0	264	211.27	103.15	113.77		Cabin	100	Belle Fourche, S. Dak.	Purchase	Mining company	Do.
22	120	23.9	23.0	160	88.12	46.25	47.79		do	150	Worcester, Mass.	Homestead	Printer	Farmer.
23	80	70.2	60.0	784	128.05	112.30	120.06		None	0	Newell, S. Dak.	do	Elevator operator	Stenographer.
24	80	60.5	60.0	120	None.	96.65	101.18		do	0	Rapid City, S. Dak.	do	Clerk	Lady homesteader.
25	80	60.5	55.0	636	None.	108.09	115.31		do	0	Los Angeles, Calif.	do	Retired farmer	Farmer.
26	80	51.2	50.0	340	107.50	81.90	73.41		do	0	Newell, S. Dak.	Purchase	Banker	Do.
27	80	65.0	35.0	320	133.46	117.10	135.43		Cabin	200	Rapid City, S. Dak.	Homestead	Retired lady	Lady homesteader.
28	80	73.5	None.	0	153.96	120.80	145.23		None	300	Omaha, Nebr.	Purchase	Abductor	Clothing salesman.
29	160	69.0	60.0	600	189.37	105.00	119.97		Menger	0	Sturgis, S. Dak.	Homestead	Precher	Farmer.
30	160	76.0	63.0	288	197.88	121.60	119.97		None	0	San Jose, Calif.	do	Farmer, sugar-beet.	Farmer.

	80	62.9	60.0	300	141.19	100.65	116.40	do	0	Newell, S. Dak.	Purchase	Sugar-beet field-man.	Carpenter.
31	80	75.9	55.0	244	160.00	121.45	117.55	do	0	Rochester, Minn.	Homestead	Nurse.	Lady homesteader.
32	80	73.6	42.0	434	166.70	117.75	111.63	Habitable.	600	Belle Fourche, D. S.	do	County auditor.	Teacher.
33	80	75.0	None.		158.20	120.00	117.16	None.	0	Nisland, S. Dak.	Purchase	Sugar-beet field-man.	Farmer.
34	80	63.9	64.0	280	145.31	102.25	99.01	Cabin.	200	Whitehall, Wis.	Mortgage foreclosure.	Investor.	Electrician.
35	100	47.3	47.0	308	111.05	75.70	71.34	None.	0	Newell, S. Dak.	Inheritance	Farmer.	Lady homesteader.
36	80	57.3	57.0	500	136.30	91.70	74.08	Cabin.	100	Los Angeles, Calif.	Purchase	Carpenter.	Mechanic.
37	80	57.0	45.0	272	128.52	91.20	74.08	None.	0	Sioux Falls, S. Dak.	Mortgage foreclosure.	Mortgage collector.	Farmer.
38	80	68.6	40.0	200	112.34	94.10	91.13	do	0	Newell, S. Dak.	Purchase	Postmaster.	Mechanic.
39	80	63.8	25.0	400	141.03	101.75	73.28	Cabin.	50	Brookings, S. Dak.	do	Teacher.	Farmer.
40	80	60.6	15.0	60	132.65	96.95	86.80	do	50	Madison, Wis.	Mortgage foreclosure.	State employee.	Do.
41	80	44.6	25.0	125	95.85	71.35	63.23	None.	0	Los Angeles, Calif.	do	Investor.	Do.
42	80	60.6	18.0	144	95.07	39.35	40.37	Cabin.	300	Mendota, Ill.	do	Retired farmer.	Drayman.
43	80	24.6	46.0	228	117.23	54.85	33.76	do	200	Escondido, Calif.	Inheritance	Attorney.	Farmer.
44	80	46.8	28.0	320	63.90	45.75	26.05	do	300	Newell, S. Dak.	Homestead.	Clerk.	Lady homesteader.
45	40	27.0	27.0	291	88.37	44.65	28.86	Habitable.	1,000	do	Purchase	Farmer.	United States employee.
46	40	33.6	28.0	357	72.14	46.10	24.67	None.	0	Pueblo, Colo.	do	Merchant.	Laborer.
47	40	11.8	10.0	50	42.77	18.90	11.56	do	0	Pierre, S. Dak.	Bank failure.	State of South Dakota.	Gaugeman.
48	40	20.8	15.0	75	51.79	33.30	24.76	do	0	Des Moines, Iowa	Mortgage foreclosure.	Do.	Do.
49	40	30.6	25.0	750	67.76	48.95	26.39	do	0	Newell, S. Dak.	Purchase	Mortgage collector.	Undertaker.
50	160	58.0	25.0	322	166.18	62.80	68.15	Cabin.	150	do	Homestead	Farmer.	Farmer.
51	120	29.3	27.0	314	87.60	46.90	38.46	None.	0	do	do	do	Lady homesteader.
52	80	62.9	None.	0	116.97	100.65	100.42	do	0	Lead, S. Dak.	Inheritance	Dentist.	Laborer.
53	80	43.4	35.0	354	115.94	69.45	68.81	Cabin.	200	Newell, S. Dak.	Homestead	Postmaster.	Surveyor.
54	80	69.0	40.0	240	148.11	110.40	83.98	do	50	Yokohama, Japan	Purchase	Missionary.	Lady homesteader.
55	80	73.2	70.0	748	185.11	64.10	71.13	None.	0	Newell, S. Dak.	Homestead	Auctioneer.	Jeweler.
56	80	74.2	64.0	701	153.30	60.55	51.44	do	0	Sturgis, S. Dak.	Purchase	Retired teacher.	Teacher.
57	80	40.0	4.0	20	82.60	64.00	48.54	do	0	Newell, S. Dak.	Purchase	Farmer.	Farmer.
58	80	40.0	60.0	345	114.91	98.80	102.38	do	0	Ranchester, Wyo.	Homestead	Rancher.	Do.
59	120	61.5	0.0	0	137.07	105.45	105.30	do	0	Sioux Falls, S. Dak.	Mortgage foreclosure.	Mortgage collector.	Lady homesteader.
60	80	54.0	48.0	728	104.86	86.40	72.43	do	200	Newell, S. Dak.	Inheritance	Banker.	Painter.
61	80	62.9	66.0	823	153.56	111.35	116.63	Cabin.	0	Ipswich, S. Dak.	Homestead	Farmer.	Farmer.
62	80	62.5	60.0	314	124.96	103.00	124.33	None.	0	Belle Fourche, S. Dak.	Purchase	Butcher.	Railroad employee.
63	80	68.0	55.0	708	120.58	92.95	87.84	do	0	Newell, S. Dak.	Mortgage foreclosure.	Mortgage collector.	Farmer.
64	80	68.0	75.0	708	153.27	108.80	104.18	do	10	Sioux Falls, S. Dak.	do	Druggist.	Store clerk.
65	80	75.0	77.0	631	158.87	120.00	103.11	do	100	Newell, S. Dak.	do	Mortgage collector.	Farmer.
66	80	53.5	52.0	631	154.79	86.70	80.96	Barn.	100	Sioux Falls, S. Dak.	Homestead	Barber.	Farmer.
67	80	73.8	71.0	592	139.73	124.10	123.59	None.	0	Chisholm, Miss.	Mortgage foreclosure.	Candy maker.	Do.
68	80	71.6	60.0	320	135.04	114.55	120.84	Cabin.	40	Sioux Falls, S. Dak.	do	Elevator operator.	Railroad employee.
69	80	77.0	18.0	263	127.00	137.25	104.25	do	0	Glen Flora, Wis.	do	Mortgage collector.	Plumber.
70	80	60.8	45.0	460	133.03	107.30	100.03	do	100	Sioux Falls, S. Dak.	do	Banker.	Blacksmith.
71	80	69.0	68.0	710	123.70	110.40	74.41	Cabin.	0	Chadron, Neb.	Homestead	Investor.	Farmer.
72	72	80	63.0	710	155.88	118.40	94.24	do	0	Lead, S. Dak.	Mortgage foreclosure.	do	Do.
73	80	73.0	65.0	700	155.38	107.00	93.87	None.	0	Belle Fourche, S. Dak.	do	Railroad employee.	Plumber.
74	80	3.7	None.	None.	35.30	67.90	34.76	do	0	Newell, S. Dak.	Purchase	Dentist.	Blacksmith.
75	75	80	42.0	555	105.36	67.90	64.76	do	50	Sturgis, S. Dak.	Mortgage foreclosure.	Investor.	Farmer.
76	160	36.9	32.0	407	136.64	59.05	113.52	Cabin.	20	Sturgis, S. Dak.	do	do	Do.
77	160	70.2	50.0	250	186.54	128.75	113.52	do	40	Newell, S. Dak.	Purchase	Retired lady.	Laborer.
78	80	65.4	63.0	700	120.58	104.65	117.52	do			Homestead	Laborer.	

## Settlement and economics—Unoccupied farms in Newell Township, Belle Fourche project, South Dakota—Continued

Farm No.	Total area	Irrigated area	Acres in cultivation, 1928	Crop returns, 1928	General taxes, 1928	Overhead mortgage payable, 1928	Construction per year beginning 1930	Building improvements		Address of owner	Owner acquired land through—	Occupation of owner	Occupation of original entryman
								Kind	Approximate value				
79	80	43.0	30.0	595	116.46	68.80	52.57	do	100	Nisland, S. Dak.	Mortgage foreclosure.	Doctor	Farmer.
80	80	15.0	15.0	160	52.82	24.00	11.86	None	0	Newell, S. Dak.	Purchase	Farmer	Blacksmith.
81	23	23.0	23.0	294	48.70	39.80	None	do	0	Huntington Park, Calif.	Homestead	Retired farmer	Stock buyer.
82	40	32.7	29.0	200	88.63	23.10	3.78	Habitable	750	Las Cruces, Colo.	do	Farmer	United States employee.
83	40	32.4	30.0	339	74.46	51.85	38.02	Cabin	100	St. Ignace, Mont.	Inheritance	Estate	Do.
84	40	32.0	None	None	81.68	51.20	49.60	Meager	250	Almworth, Nebr.	Purchase	Retired merchant	Lady homesteader.
85	40	33.0	30.0	2,650	76.78	52.80	27.61	None	0	Newell, S. Dak.	do	Rancher	Civil Engineer.
86	40	24.8	20.0	300	61.96	29.45	23.96	Habitable	1,200	do	Homestead	Merchant	Merchant.
87	120	30.7	25.0	1,312	101.26	49.10	37.76	None	0	do	Mortgage foreclosure	Printer	Attorney.
88	60	47.4	47.0	475	119.55	75.85	64.83	Habitable	500	Lead, S. Dak.	Homestead	Miner	Miner.
89	40	37.6	37.0	400	81.16	61.75	38.14	None	0	Newell, S. Dak.	Purchase	Farmer	Do.
90	60	16.6	None	None	42.77	2.65	18.42	do	75	Kenselair, Ind.	Inheritance	Attorney	Do.
91	80	74.2	74.0	520	133.98	118.70	92.54	Cabin	300	Palo Alto, Calif.	Homestead	Merchant	Clerk.
92	100	57.1	56.0	786	139.90	91.55	67.27	do	0	Newell, S. Dak.	Purchase	Farmer	Contractor.
93	80	69.0	60.0	1,200	148.66	54.35	44.91	None	0	Nevada, Mo.	do	Preacher	Preacher.
94	80	68.7	45.0	575	151.50	47.25	75.27	Cabin	50	Nisland, S. Dak.	Homestead	Store clerk	Clerk.
95	40	40.0	30.0	600	83.48	64.00	43.39	None	0	Kanoka, Mo.	Mortgage foreclosure	Farmer	Farmer.
96	80	62.9	60.0	381	148.92	100.65	68.84	Cabin	150	Belle Fourche, S. Dak.	Bank failure	State of South Dakota.	United States employee.
97	80	65.9	60.0	721	129.34	105.45	94.35	Habitable	250	Montevideo, Minn.	Homestead	Farmer	Farmer.
98	80	65.0	60.0	720	141.97	104.00	81.27	None	0	Brighton, Colo.	Purchase	Lumberman	United States employee.
99	160	132.2	125.0	1,400	283.42	211.50	161.06	do	0	Denver, Colo.	do	United States employee.	Do.
100	80	47.0	40.0	640	112.08	75.20	65.83	do	0	Newell, S. Dak.	do	Farmer	Farmer.
	8,873	5,436.9	3,974.0	40,601	12,385.97	8,393.62	7,408.84		13,735				

## CHINOOK DIVISION, MILK RIVER PROJECT, MONTANA

(By L. H. Mitchell, superintendent Shoshone project, Wyoming)

## CONCLUSIONS

1. This division is divided into five irrigation districts, as follows: Fort Belknap, Alfalfa Valley, Zurich, and Harlem on the north side of the Milk River, and Paradise on the south side of the river. The diversion dams, pumping plant, canals, laterals, and appurtenant structures have been constructed by the various districts. The storage dam (St. Marys) was constructed by the United States, and the economic and social benefits, in my opinion, justified its construction.

2. The Utah-Idaho Sugar Co. have a beet-sugar factory at Chinook, operated to about one-third capacity. To the Canadian boundary, a distance of about 30 miles on the north, and to the Missouri River, about 60 miles on the south, the stockmen have thousands of sheep and cattle that are shipped each fall to the eastern feeding markets. The opportunities offered here for feeding beet pulp, alfalfa, and barley to range stock can not be equalled. Some of the more energetic, up-to-date irrigation farmers have demonstrated that sugar beets with stock feeding are profitable and it is the kind of agriculture that pays best under irrigation.

3. Nearly all of the irrigable land that will produce satisfactory crops under a proper system of farming is being tilled. Large holdings, however, prevent maximum returns. The entire division is, to a large extent, owned by the original settler, who is still of the opinion that one should have not less than 320 irrigable acres to be successful. There are two classes of unproductive land—(a) land that was productive but now seeped; (b) land that will require several years of experimental work or a special type of farming. This is known locally as "gumbo" soil, and the surface is very flat. It is this type of land that is used, if farmed at all, for blue-joint meadows. A few fields of this class of land had been partially subdued with alfalfa and clover.

4. Delayed settlement can be attributed to the following:

(a) Poor farming in general and likewise a general appearance of poverty. This kind of farming can generally be expected where large holdings (320 to 640 acres) predominate.

(b) Poor soil on about 30 per cent of the total irrigable area of the five districts.

(c) Lack of capital on part of settlers now on project.

(d) Lack of credit.

There are other contributing factors that have helped in retarding settlement, viz: (a) Unsatisfactory returns from farming everywhere; (b) high State and county taxes on irrigated lands.

5. For financial standing of all five districts, see accompanying tables.

The per irrigable acre cost, as assessed in 1928, for interest on bonds and their retirement, operation, and maintenance, including St. Mary storage, was as follows:

Charges assessed by district:	Per acre
Fort Belknap.....	\$2. 05
Alfalfa Valley.....	2. 00
Zurich.....	3. 85
Harlem.....	2. 50
Paradise.....	2. 80

To the above must be added the State and county taxes, which amount to from 50 to 85 cents per acre. It is obvious that poor land or land poorly farmed can not meet these charges. The Harlem district has completed paying its bonded debt and it is in condition to meet the irrigation payments and taxes. The Alfalfa Valley irrigation district has very little land that will not produce, and this district can likewise make the required payments. The Fort Belknap district has, I would estimate, 800 acres of seeped land included in the pay land (class or series No. 9) by the State department of agriculture. An examination of this soil showed that the subsurface contained sufficient sodium carbonate (black alkali) to make the growing of crops very questionable. This alkaline condition has no doubt been brought about by damming Red Rock Creek and sloughs for flood irrigation and stock water, thus raising the water plane and likewise the destructive salts. Lands now nonproductive due to seepage were, I was advised, at one time very productive. The cost of drains to relieve this area and protect

threatened areas might be \$25,000. The distribution system is badly in need of cleaning. The Paradise district has approximately 1,200 acres of marginal lands. Some of the good land, not to exceed 5 per cent, is seeped, but this area will probably increase as irrigation increases. The diversion dam for this division is badly in need of repairs. The main canal is silted up badly and should, in the very near future, be cleaned. A large Ruth machine would be a profitable investment for cleaning the canals and laterals. The poor condition of the laterals with the plant growth is responsible to a large degree for the seepage. The Zurich district is the only one of the five that has what can be considered a heavy bonded indebtedness. If this district could be relieved temporarily, however, from paying the parties interested, obligations on the poor quality lands, while in that status, it no doubt will succeed. There are about 1,885 acres or 21 per cent of marginal lands and requiring the good lands to pay the delinquent charges with such high bonded indebtedness may be more than the average farmer can pay, especially until more profitable crops are produced and more livestock is on the farm.

Generally speaking, only poor lands are delinquent in taxes. The best example was on the Paradise district where 1,850 acres are delinquent in 1928 taxes. In such cases the districts increase the per acre assessment to raise the amount required. The bonding company of the Zurich district secures tax deeds to lands delinquent and they are making great progress in securing new farmers on the land that will produce crops. The commissioners of all the irrigation districts do not favor the Bureau of Reclamation trying to settle lands obtained through purchase of tax certificates until agriculture is more profitable, knowing that only poor lands go delinquent.

6. To bring about complete project development three important changes are needed, viz:

(a) More settlers or smaller holdings.

(b) More stock on farm. This requires credit which is not available. The local banks are not favorable to loaning for beet help or any small farm development. They are large stock (range) bankers.

(c) Exclusion of poor producing lands, while in that status, from payments to the bonding people and United States, and likewise equitable assessed valuation for county and State taxes.

A failure to bring about any one of the above important changes might be responsible for the failure of any district other than Harlem and possibly Alfalfa Valley. The need mentioned under (a) can be brought about best through education. More demonstrations of what can be accomplished through intensive farming would attract outside people. The county agents and railroads can help in this educational program. The solution of (b) is either a State or national problem. If Congress can help to make the districts solvent, exclude temporarily from construction payments poor lands, it would appear just as sound and good business to assist in a vastly more important need—that of financing the settler in stocking his place and in having better buildings for both stock and family.

If the settlers, landowners, and leaders show the fullest desire to cooperate in making the enterprise a success, do not repudiate a just debt and make an honest effort to return the investment made by the United States at the earliest possible date, and then fail, it is my belief from past experience Congress will look with favor upon some plan of relief due to lands being nonproductive.

7. Drainage is badly needed on the Fort Belknap district. The commissioners have an estimate of \$25,000 for this work. It is believed this amount is too low, as experience has proven that drainage areas generally are underestimated and the cost correspondingly increases. How the district can finance this work has not been worked out.

8. The price of average productive land exclusive of buildings is about \$35 per acre. The terms are generally \$500 to \$1,000 down, balance on crop payment or cash plan. The rate of interest on deferred payments is 6 and 8 per cent. There is no evidence of cutting of large holdings and placing thereon buildings and fences, or of making small farms going concerns. A new settler should possess stock and equipment and other assets not "frozen" valued at \$3,000 to succeed. If one does not possess this amount of capital it is advisable to not try the undertaking as no credit is available.

9. To carry out the much needed stocking, improving and equipping of farms no known credit is available. It would appear that either the State or Federal Government would be justified in furnishing this credit.



10. A summary of the entire situation can be best obtained by analyzing the accompanying tables, also the soil map. This soil survey, conducted by the agricultural department of the State of Montana, is comparable to that conducted by the State of Wyoming on the Shoshone Federal project, where the writer is familiar with the system followed in the classification work. Considerable time was devoted in the field of the Chinook division checking and comparing the various soils indicated on the map with actual conditions, and I agree with their findings.

Knowing that about one-third of the area now assessed is poor land (marginal and nonpay lands), that the average value per acre in 1927 of crops grown was \$21, and further considering the charges for interest and retirement of bonds, leads me to believe that Congress should look with favor on some form of relief. (The information secured pertaining to soil is merely for this report and should be construed as an estimate only.)

Whatever the nature of any relief, it is hoped it will be conditional upon the county adjusting the assessed valuation to an equitable basis and upon the bonding companies granting relief similar to that approved by Congress.

#### KEY TO SOIL CLASSIFICATION MAP

Havre loam.....	First-class sandy loam.
Havre silt loam.....	Good soil.
Havre silty clay loam.....	A heavier soil than Havre and more difficult to handle.
Harlem silty clay loam.....	A heavy soil that is quite productive, needs surface drainage in many places; requires special handling.
Harlem clay.....	Too heavy for farming; can be utilized for hay only, which will not pay maintenance and construction of irrigation. Temporarily non-productive at least.
Laurel <sup>1</sup> clay.....	Same position as Harlem clay.
Laurel fine sandy loam.....	Alkaline and poorly drained; nonagricultural.
Wayne clay loam.....	Scabby nonagricultural; excess salts and drainage problem; low grazing value.
Cheyenne fine sandy loam.....	Good soil type; requires humus building; soil blowing a problem.
Cheyenne loam.....	A good soil type.
Cheyenne gravelly loam.....	Too much gravel for farming except for hay and pasture.
Tripp fine sandy loam.....	Same as Cheyenne fine sandy loam.
Pondera loam.....	A fair soil but largely nonirrigable.
Scobey loam.....	A fair soil but largely nonirrigable.
Phillips loam.....	Marginal.

#### Classification of lands

District	Pay land		Marginal		Nonpay lands		Acres now assessed
	Acres	Per cent	Acres	Per cent	Acres	Per cent	
Fort Belknap.....	6,310	81.6	170	2.2	1,253	16.2	17,733
Alfalfa.....	2,970	78.3	740	19.5	80	2.2	13,780
Paradise Valley.....	8,540	77.4	1,200	10.8	1,203	11.8	11,033
Zurich.....	5,765	64.0	1,885	20.9	1,360	15.1	9,010
Harlem.....	6,899	52.6	4,520	39.0	176	1.4	11,586
Total.....	30,465		8,515		4,162		43,142

<sup>1</sup> Acreage changes from year to year but slightly. Various classes of land taken from survey map of State agricultural departments.

Pay land includes acreage under (2), (4), (9), (12), and (15). (See legend.) This land is comparable to the Bureau of Reclamation classes 1 to 3 and good class 4 lands.

Marginal lands are (9c). (See legend.) These lands are comparable to poor class 4 lands. Bureau of Reclamation, and good class 5 lands. By careful handling and raising only certain crops these lands can be made to produce a fair crop.

Nonpay lands are too poor to justify farming until some future time.

## OFFICERS OF RESPECTIVE DISTRICTS

Alfalfa Valley irrigation district: President, A. L. Benton; secretary, R. H. Clarkson; commissioner, John Brummer.

Fort Belknap irrigation district: President, H. B. Bonebright; vice president, Fred Wallen; secretary, L. V. Bogy.

Harlem irrigation district: President, Thomas M. Everett; vice president, Charles Johnson; secretary, George H. Tout; commissioner, A. L. Johnson.

Paradise Valley irrigation district: President, R. E. Musgrove; secretary, J. F. Sharples; commissioner, M. Thompson, J. F. Overcast.

Zurich irrigation district: President, John W. Acher; secretary, H. M. Montgomery; commissioners, Thos. E. Buckley, Stanley Spayhova.

## OUTLINE OF ECONOMIC SURVEY, 1929

1. *History.*—(a) Reconnaissance and preliminary surveys were begun by the Reclamation Service on the Milk River project in 1902, but it was soon discovered that the water rights on the river were in such chaotic condition that it would be unsafe to bring new water into the Milk River from the St. Mary River watershed, with the expectation of disposing of the new water, unless the extent of the old rights on the Milk River were settled by agreement or by decree of court. The latter method was regarded as expensive and slow, and resort was therefore had to a contract settling the old or vested rights. The vested-right contract is dated November 29, 1911.

There is considerable quantity of vested-right land in the Chiuook division, and the landowners of the division organized themselves into districts, and constructed their own diversion dams and distribution systems.

During the years 1920 to 1922 the districts entered into contracts with the United States to pay the project construction charges in 20 years and at such dates and in such amounts as might be fixed by the department under the reclamation extension act of August 13, 1914 (38 Stat. 686). The contract with the Paradise Valley irrigation district is dated December 28, 1920; the contract with the Fort Belknap, Zurich, and Alfalfa Valley irrigation districts is dated October 24, 1921, and the contract with the Harlem irrigation district is dated September 1, 1922. Unfortunately, however, only the contract with the Harlem district was validated in the manner required by the State law (i. e., by a petition signed by a requisite percentage of the landowners of district land, representing the requisite percentage of district land), and by reason of no such petition having been obtained in connection with the Fort Belknap, Zurich, and Alfalfa Valley and Paradise Valley district contracts, there are no valid contracts between these four districts and the United States. The four districts are not bound to pay the construction charges for a Government water right, and the United States is likewise not bound to furnish water to them. Water has been rented to the Chinook districts since and including the following years upon payment of operation and maintenance charges only: Fort Belknap and Harlem districts since 1918, the Paradise Valley district since 1919, the Alfalfa Valley district since 1922, and the Zurich district since 1925.

2. *Present economic and agricultural conditions of project.*—(a) The lands of the entire division are in large holdings, one of the largest being A. C. M. Co. This concern inherited a large area of land that is nonproductive. Old stockmen, as a rule, have most of the large tracts, although a few are farming, mostly in hay and grain, as much as a section.

(b) There are several figures representing the irrigable area of the division. The assessed area (1928), by districts, is given in the accompanying table. In arriving at the district's share of St. Mary's storage cost 30,900 acres are used, and for contracting purposes this is probably safe.

(c) Grain and hay are the principal crops. Sugar-beet acreage has increased gradually as follows:

	Acreage in beets
1925.....	2, 015
1926.....	1, 772
1927.....	1, 793
1928.....	2, 834
1929.....	4, 007

The average returns per acre follow, with value:

Alfalfa, 2 tons, at \$7 per ton.....	\$14. 00
Beets, 8.2 tons, at \$7 per ton.....	57. 40
Wheat, 20 bushels, at 80 cents per bushel.....	16. 00
Barley, 40 bushels, at 40 cents per bushel.....	16. 00
Potatoes, 225 bushels <sup>1</sup> .....	( <sup>1</sup> )
Native hay, 1 ton, at \$5 per ton.....	5. 00

(d) The good (pay land) soil is producing, when properly farmed, very good crops and offers wonderful opportunities. One beet grower had a maximum yield of 15.29 tons per acre. The marginal lands (see accompanying table for acreage as found by Montana Agricultural Department) will only produce crops by following expensive farming methods, and alfalfa is the best paying crop on this type of land. A 1-ton-per-acre yield is considered an average for this land.

(e) The main crops, hay and grain, require very little real cultivation. This is what could be expected from so many large holdings. Beet farming and feeding has just started and is on the increase.

3. *Resident farmers.*—(a) Considering the many years of experience the resident farmers have had in large farming operations, it is gratifying to find the success in row crop. It often takes years to change a system of farming. The people on this division interviewed are above the average in capability and from the appearance of growing crops of beets it is safe to predict this division will succeed.

(b) There are very few new landowners. Those now owning farms are, to a large extent, "old-timers" who have either raised hay to sell by shipping or to local stockmen or are the old-type stockmen.

(c) The principal indebtedness consists of the bonds for the construction of the irrigation works. The amount for each district is given in the financial statement. The rate of interest is 6 per cent. The Zurich and Paradise Valley districts have the largest bonded debt. The accompanying tables show in detail the annual payments required from these districts.

(d) It is estimated that there are a set of farm buildings to every 320 acres of land. The average value of each set of buildings is placed at \$4,000 and the farm equipment per farm at \$1,200. To bring this division to a full state of development, there should be, in the opinion of the writer, a settler to every 100 acres, or three times the present number.

(e) To subdivide the holdings, buildings and additional fences are required. A comfortable set of farm buildings would cost about \$3,000, fences \$250, and equipment not less than \$1,000.

(f) At present, the farmers, in the main, are producing and selling unfinished products such as hay and grain. The development of the sugar-beet industry is helping to change the system of farming. There is a pronounced lack of livestock on the farm, the value in 1928 being only \$195,000.

4. *Size of holding for average farmer adequately financed.*—A representative of three banks and the local superintendents of the sugar company were interviewed on this subject and their views were as follows: Bankers, 80, 120, and 200 acres, respectively; manager of sugar-beet company, 120 acres. In the opinion of the writer, 100 acres is all one man with an average family can properly handle.

5. *Price of land.*—Unlike other commodities, there does not appear to be a standard price for farm lands. Investigation showed the price range to be from \$10 to \$50 per acre, with terms to satisfy purchaser and interest rate about 6 per cent. The low priced land, being likewise poor soil, is high at any price. The good land at \$50 an acre with buildings would, in my opinion, not only make a satisfactory home, but would pay good interest on the investment.

6. *Demand for land.*—There is very little demand for irrigated lands for the following reasons:

(a) Neighboring dry-land farmers are making a living with less work; (b) Irrigation not popular and the project not sufficiently sold to the local business people; (c) Very few, if any, attractive farms of about 100 acres with habitable buildings for sale. Many of the present owners would like to subdivide and sell some of their land, but have not the capital to put up the necessary improvements. The local banks favor loans for short periods to the large stockmen.

7. *Capital required to develop a farm.*—(a) Cost of land. An average 100-acre farm would cost \$3,000 with a small down payment and balance at 6 per cent interest. The price of land is not retarding development.

<sup>1</sup>No sale in 1928

(b) Very little ditching or leveling has been done and fortunately very little other than along the river is required. The cost of this work would vary from \$1 per acre for the best land to \$10 per acre for some of the sandy lands near the river.

(c) The cost of habitable buildings, stock fences, and a domestic water supply would be about \$3,500.

(d) A full set of farm equipment, not including work horses, would cost from \$1,000 to \$1,500.

8. *Source of credit for development.*—There is no known credit available for development. Unfortunately the sugar company has found it necessary to finance the beet farmers. The local banks only loan on chattels, preferably to large stockmen. The sugar company charges 8 per cent interest and the banks 10 per cent.

9. *Markets.*—All wheat is shipped to eastern markets (Twin Cities). Barley, oats, and corn are used locally. Hay is consumed locally. Beets are sold to Utah-Idaho Sugar Co. with factory at Chinook. The hay market is very unsatisfactory to those without stock. With an open winter there is very little demand, while in hard winters there is a fair price. The wheat farmers must compete with the nonirrigated farms, which covers a large territory, including Canada.

10. *Transportation.*—The project is traversed through the entire length by the Great Northern Railway and transportation facilities are favorable for rapid development.

11. *Financial obligations of districts.*—(a) For bonded indebtedness of the five irrigation districts see accompanying tables.

(b) Each district's proportionate share of cost of St. Mary's storage is \$15 per acre.

(c) The various districts operate and maintain the irrigation works in their district. The cost varies materially from year to year. In the winter of 1928-29 the diversion dam for the Fort Belknap, Alfalfa, and Zurich districts was repaired at a cost of about 60 cents per irrigable acre. While the operation and maintenance cost is rarely below 50 cents and above \$1.50 per acre, there is evidence that the cost should be maintained at about \$1 per acre.

(d) The assessed value of irrigated land by the county is more than the land is priced at by the owner. It was the consensus of opinion that this error should be adjusted. A typical case under the Paradise district is given. A 160-acre farm with 126 irrigable acres with average improvements and equipment in 1928 paid \$505 for taxes, divided as follows: \$153 for county and \$352 for district charges, or about \$4 per irrigable acre.

12. *Concessions by creditors of districts.*—On the Fort Belknap district a large percentage of the poor land is owned by parties who heretofore have paid the district and county taxes. Considerable concern is shown by the commissioners of the district, fearing that in the near future these lands will go delinquent for taxes, resulting in the remaining lands carrying the load. On the Paradise district it will be necessary to increase the per acre levy of \$2.80 due to 1,850 acres being delinquent in 1928 taxes. On the Zurich district the bonding company buys in the land delinquent in taxes. For the rapid development of these three irrigation districts, (and whatever concessions these receive, Harlem and Alfalfa Valley should also have), the following is suggested.

(a) Adjustment of county taxes by having the assessed valuation equitably as compared with nonirrigated lands.

(b) By temporarily excluding the poor producing lands from payment of interest on bonds, also payment on principal and the St. Mary storage construction charge. This will require the cooperation of the bonding company and favorable action by Congress.

*Valuable information pertaining to the Chinook division, Milk River project, Montana*

Acres for which water was available, 1928.....	43,950
Acres irrigated.....	22,362
Acres cropped.....	22,362
Value of crops.....	\$473,190
Value per acre.....	\$21.16
Value of livestock, 1928.....	\$195,146
Value of farm equipment.....	\$104,912
Number of irrigated farms, 1927.....	125
Farmers with poor crop results.....	24

Farmers with fair crop results.....	55
Farmers with good crop results.....	27
Farmers with excellent crop results.....	19
Total construction cost, United States.....	\$764, 173
Construction charge per acre.....	\$15

*Zurich irrigation district*

[Bonded debt, \$280,000]

Year	Retirement of bonded debt				St. Mary storage				Gross annual per acre	
					20-year plan		40-year plan			
	Principal	Interest	Total	Per acre	Total	Per acre	Total	Per acre	20-year	40-year
1928	\$10,000.00	\$16,800.00	\$26,800.00	\$3.214					\$3.214	\$3.214
1929	10,000.00	16,200.00	26,200.00	3.142					3.142	3.142
1930	10,000.00	15,600.00	25,000.00	3.070					3.070	3.070
1931	10,000.00	15,000.00	25,000.00	2.998					2.998	2.998
1932	10,000.00	14,400.00	24,400.00	2.920	\$2,501.58	\$0.30	\$3,126.98	\$0.375	3.226	3.301
1933	10,000.00	13,800.00	23,800.00	2.854	2,501.58	.30	3,126.98	.375	3.154	3.229
1934	10,000.00	13,200.00	23,200.00	2.782	2,501.58	.30	3,126.98	.375	3.082	3.157
1935	10,000.00	12,600.00	22,600.00	2.710	2,501.58	.30	3,126.98	.375	3.010	3.085
1936	10,000.00	12,000.00	22,000.00	2.638	5,003.16	.60	3,126.98	.375	3.238	3.013
1937	10,000.00	11,400.00	21,400.00	2.564	5,003.16	.60	3,126.98	.375	3.164	2.939
1939	10,000.00	10,800.00	20,800.00	2.494	7,504.74	.90	3,126.98	.375	3.322	2.797
1940	10,000.00	9,600.00	19,600.00	2.359	7,504.74	.90	3,126.98	.375	3.250	2.725
1941	10,000.00	9,000.00	19,000.00	2.278	7,504.74	.90	3,126.98	.375	3.178	2.653
1942	14,000.00	8,400.00	22,400.00	2.686	7,504.74	.90	3,126.98	.375	3.586	3.061
1943	14,000.00	7,560.00	21,560.00	2.585	7,504.74	.90	3,126.98	.375	3.485	2.960
1944	14,000.00	6,720.00	20,720.00	2.484	7,504.74	.90	3,126.98	.375	3.384	2.859
1945	11,000.00	5,880.00	19,880.00	2.383	7,504.74	.90	3,126.98	.375	3.283	2.758
1946	14,000.00	5,040.00	19,040.00	2.282	7,504.74	.90	3,126.98	.375	3.182	2.657
1947	14,000.00	4,200.00	18,200.00	2.181	7,504.74	.90	3,126.98	.375	3.081	2.556
1948	14,000.00	3,360.00	17,360.00	2.080	7,504.74	.90	3,126.98	.375	2.980	2.455
1949	14,000.00	2,520.00	16,520.00	1.979	7,504.74	.90	3,126.98	.375	2.879	2.354
1950	14,000.00	1,680.00	15,680.00	1.878	7,504.74	.90	3,126.98	.375	2.778	2.253
1951	14,000.00	840.00	14,840.00	1.779	7,504.74	.90	3,126.98	.375	2.673	2.152
1952-1971							3,126.98	.375		.375
Total	280,000.00	260,400.00	540,400.00	61.810	125,079.00	15.00	125,079.00	15.000	79.810	79.810

*Paradise irrigation district*

[Bonded debt, \$120,000; 20 years]

Year	Retirement of bonded debt				St. Mary storage				Gross annual per acre	
					20-year plan		40-year plan			
	Principal	Interest	Total	Per acre	Total	Per acre	Total	Per acre	20-year	40-year
1927		\$7,200.00	\$7,200.00							
1928	\$6,000.00	7,200.00	13,200.00	\$1.181					\$1.181	\$1.181
1929	6,000.00	6,840.00	12,840.00	1.119					1.149	1.149
1930	6,000.00	6,480.00	12,480.00	1.117					1.117	1.117
1931	6,000.00	6,120.00	12,120.00	1.085					1.085	1.085
1932	6,000.00	5,760.00	11,760.00	1.053	\$3,352.30	\$0.30	\$4,190.25	\$0.375	1.353	1.428
1933	6,000.00	5,400.00	11,400.00	1.021	3,352.30	.30	4,190.25	.375	1.321	1.396
1934	6,000.00	5,040.00	11,040.00	.989	3,352.30	.30	4,190.25	.375	1.289	1.364
1935	6,000.00	4,680.00	10,680.00	.957	3,352.30	.30	4,190.25	.375	1.257	1.332
1936	6,000.00	4,320.00	10,320.00	.925	6,701.60	.60	4,190.25	.375	1.525	1.300
1937	6,000.00	3,960.00	9,960.00	.893	6,701.60	.60	4,190.25	.375	1.493	1.268
1938	6,000.00	3,600.00	9,600.00	.861	10,056.90	.90	4,190.25	.375	1.761	1.236
1939	6,000.00	3,240.00	9,240.00	.828	10,056.90	.90	4,190.25	.375	1.728	1.208
1940	6,000.00	2,880.00	8,880.00	.795	10,056.90	.90	4,190.25	.375	1.695	1.170
1941	6,000.00	2,520.00	8,520.00	.762	10,056.90	.90	4,190.25	.375	1.662	1.137
1942	6,000.00	2,160.00	8,160.00	.729	10,056.90	.90	4,190.25	.375	1.629	1.104
1943	0,000.00	1,800.00	7,800.00	.697	10,056.90	.90	4,190.25	.375	1.597	1.072
1944	6,000.00	1,440.00	7,440.00	.665	10,056.90	.90	4,190.25	.375	1.565	1.040
1945	6,000.00	1,080.00	7,080.00	.633	10,056.90	.90	4,190.25	.375	1.533	1.008
1946	6,000.00	720.00	6,720.00	.601	10,056.90	.90	4,190.25	.375	1.501	.976
1947	6,000.00	360.00	6,360.00	.569	10,056.90	.90	4,190.25	.375	1.469	.944
1948					10,056.90	.90	4,190.25	.375	.900	.375
1949					10,056.90	.90	4,190.25	.375	.900	.375
1950					10,056.90	.90	4,190.25	.375	.900	.375
1951-1971					10,056.90	.90	4,190.25	.375	.900	.375
Total	120,000.00	90,000.00	210,000.00	98.88	167,615.00	15.00	167,615.00	15.000	33.880	33.880

*Financial standing of Zurich irrigation district as found by the State examiner on April 1, 1929, and as of record in the county records of Blaine County*

	Balance	Overdraft
Secretary's balance of funds March 31, 1928:		
General fund.....		\$2,829.90
Maintenance fund.....		113.77
Construction fund.....		7,811.24
Interest fund.....	\$4,870.40	
Reclamation fund.....	611.88	
Total.....	5,482.28	10,754.91
Less cash balances.....		5,482.28
Balance, all funds, overdraft.....		5,272.63
To receipts March 31, 1928, to Apr. 1, 1929:		
General fund.....	1,181.73	
Maintenance fund.....	3,859.44	
Construction fund.....	590.85	
Reclamation fund.....	1,692.44	
Drainage fund.....	250.00	
Sinking fund.....	5,597.25	
Interest fund.....	13,390.99	
Interest fund Col. warrant No. 98.....	75.68	
		26,365.75
By disbursements, same period:		
General fund.....	909.20	
Maintenance fund.....	10,633.33	
Interest fund.....	17,181.40	
Reclamation fund.....	1,418.16	
Drainage fund.....	10,711.62	
Sinking fund.....	5,000.00	
		45,853.71
Overdraft balance all funds, Apr. 1, 1929.....		21,487.96
Outstanding warrants:		
General fund.....	2,905.04	
Maintenance fund.....	7,135.56	
Construction fund.....	7,334.98	
Interest fund.....	355.18	
Drainage fund.....	10,579.69	
	28,310.45	
Less county treasurer's cash balance:		
General fund.....	\$347.67	
Maintenance fund.....	247.90	
Construction fund.....	114.59	
Interest fund.....	1,510.85	
Reclamation fund.....	886.16	
Bond sinking fund.....	597.25	
Drainage fund.....	118.07	3,822.49
		24,487.96
District indebtedness:		
Warrants outstanding Apr. 1, 1929.....		\$28,310.45
Bonds outstanding Apr. 1, 1929.....		275,000.00
Total debt.....		303,310.45

*Financial standing of Paradise Valley irrigation district as found by the State examiner on April 1, 1929, and as of record in the county records of Blaine County, Mont.*

	Overdraft	Balance
Secretary's balance all funds, last examination:		
General fund.....		\$1,706.99
Maintenance fund.....		1,222.91
Bond-interest fund.....		1,268.57
Construction fund, overdraft.....	\$386.67	
	386.67	4,198.47
Less overdraft.....		386.67
Balance all funds, April 30, 1928.....		3,811.80
To receipts, May 1, 1928 to April 1, 1929:		
General fund.....	11,395.97	
Maintenance fund.....	1,394.50	
Construction fund.....	2,412.26	
Bond-interest fund.....	9,173.43	
Bond-retirement fund.....	2,678.00	
		27,054.16
		30,865.96
By disbursements, same period:		
General fund.....	12,483.71	
Maintenance fund.....	1,871.56	
Construction fund.....	3,031.11	
Bond-interest fund.....	8,720.00	
Bond-retirement fund.....	2,500.00	
		28,606.38
Balance, all funds, April 1, 1929.....		2,259.58
County treasurer's balance, all funds, April 1, 1929.....	3,824.73	
Less outstanding warrants.....	1,565.15	
		2,259.58
Secretary's fund balances and outstanding warrants, April 1, 1929:		
General fund.....		619.25
Maintenance fund.....		745.85
Bond-interest fund.....		1,722.00
Bond-retirement fund.....		178.00
		3,265.10
Construction fund, overdraft.....		1,005.52
		2,259.58
Secretary's balance, all funds, April 1, 1929.....		
County treasurer's balance, all funds, April 1, 1929:		
General fund.....	644.25	
Maintenance fund.....	869.90	
Construction fund.....	410.58	
Bond-interest fund.....	1,722.00	
Bond-retirement fund.....	178.00	
		3,824.73
Less outstanding warrants:		
General fund.....	\$25.00	
Maintenance fund.....	124.05	
Construction fund.....	1,416.10	
	1,565.15	
		2,259.58
District indebtedness:		
Outstanding warrants, April 1, 1929.....		\$1,565.15
Outstanding bonds, April 1, 1929.....		112,500.00
Total.....		114,065.15



*Financial standing of Fort Belknap irrigation district as found by the State examiner on April 1, 1929, and as of record in the county records of Blaine County*

	Balance	Overdrafts
Secretary's balance, all funds last examination, Mar. 31, 1928:		
General fund.....		\$5,409.06
Construction fund.....		411.04
Bond interest fund.....	\$3,111.25	
Less.....	3,111.25	5,820.10
Overdraft balance, all funds, Mar. 31, 1928.....		3,111.25
To receipts from Apr. 1, 1928, to Apr. 1, 1929:		2,708.25
General fund.....	4,031.47	
Construction fund.....	656.59	
Bond interest fund.....	3,988.95	
Bond retirement fund.....	3,707.00	12,984.01
By disbursements, same period:		10,275.16
General fund.....	10,680.05	
Construction fund.....	195.56	
Bond interest fund.....	5,349.20	
Bond retirement fund.....	3,500.00	19,724.81
Overdraft balance, all funds, Apr. 1, 1929.....		9,449.65
Outstanding warrants, all funds, Apr. 1, 1929.....	12,208.23	
Less county treasurer's balance.....	2,758.58	9,449.65
Secretary's fund balances and outstanding warrants, Apr. 1, 1929:		
Fund balances—		
General fund.....		11,457.64
Construction fund.....	49.99	
Bond interest fund.....	1,751.00	
Bond retirement fund.....	207.00	
Less.....		2,007.99
Secretary's overdrafts balance, all funds, Apr. 1, 1929.....		9,449.65
Outstanding warrants—		
General fund.....	11,894.67	
Construction fund.....	313.56	
Total.....	12,208.23	
Less county treasurer's balance, Apr. 1, 1925:		
General fund.....	\$437.03	
Construction fund.....	363.55	
Bond interest fund.....	1,751.00	
Bond retirement fund.....	207.00	2,758.58
		9,449.65
District indebtedness:		
Outstanding warrants, Apr. 1, 1929.....		\$12,208.23
Outstanding bonds, Apr. 1, 1929.....		71,500.00
Total.....		83,708.23

*Financial standing of Alfalfa Valley irrigation district as found by the State examiner on April 1, 1929, and as of record in the county records of Blaine County*

	Overdraft	Balance
Secretary's balance all funds last examination, Mar. 31, 1928.....		\$2,300.65
General fund.....	\$1,251.90	
Construction fund.....		215.72
Bond interest fund.....		2,942.08
Reclamation fund.....		394.77
	1,251.90	3,552.55
Less overdraft.....		1,251.90
		2,300.65
To receipts Apr. 1, 1928, to Apr. 1, 1929:		
General fund.....	3,101.15	
Construction fund.....	613.50	
Bond interest fund.....	2,333.94	
Reclamation fund.....	752.70	
Bond retirement fund.....	2,044.00	8,845.29
		11,145.94
By disbursements during same period:		
General fund.....	6,089.44	
Construction fund.....	849.82	
Bond interest fund.....	2,786.00	
Reclamation fund.....	617.50	
Bond retirement fund.....	2,000.00	12,342.76
Secretary's balance, all funds, Apr. 1, 1929, overdraft.....		1,196.82
County treasurer's cash balance, all funds, Apr. 1, 1929.....	3,561.90	
Less outstanding warrants Apr. 1, 1929.....	4,758.72	1,196.82
Secretary's fund balances and outstanding warrants, Apr. 1, 1929:		
General fund.....	4,240.19	
Construction fund.....	20.60	
Bond interest fund.....		2,490.00
Reclamation fund.....		529.97
Bond retirement fund.....		44.00
	4,260.79	3,063.97
Less overdrafts.....		4,260.79
Secretary's balance, all funds, Apr. 1, 1929, overdraft.....		1,196.82
County treasurer's cash balance Apr. 1, 1929:		
General fund.....	\$497.93	
Bond retirement fund.....	44.00	
Bond interest fund.....	2,490.00	
Reclamation fund.....	529.97	
	3,561.90	
Outstanding warrants:		
General fund.....	4,738.12	
Construction fund.....	20.60	
	4,758.72	1,196.82
District indebtedness:		
Warrants outstanding Apr. 1, 1929.....		\$4,758.72
Bonds outstanding Apr. 1, 1929.....		33,000.00
Total.....		37,758.72

*Financial standing of Harlem irrigation district as found by the State examiner on April 1, 1929, and as of record in the county records of Blaine County*

	Balance	Overdraft
Secretary's balance of funds, last examination, Apr. 30, 1928:		
General fund, overdraft.....		\$7,087.05
Reclamation fund.....	\$1,258.22	
Bond interest fund.....	3,080.48	4,338.70
Secretary's balance, all funds, Apr. 30, 1928, overdraft.....		2,748.35
To receipts May 1, 1928, to Apr. 1, 1929:		
General fund.....	17,231.98	
Reclamation fund.....	2,726.88	
Bond interest fund.....	11,993.52	31,952.33
		29,203.98
By disbursements during same period:		
General fund.....	14,197.96	
Reclamation fund.....	2,971.25	
Bond interest fund.....	9,142.00	26,311.21
Secretary's balance, all funds, Apr. 1, 1929.....		2,892.77
County treasurer's balance, all funds, Apr. 1, 1929.....	7,726.62	
Less outstanding warrants, same date.....	4,833.85	
		2,892.77
Secretary's fund balance and outstanding warrants, Apr. 1, 1929:		
Reclamation fund.....		1,013.80
Bond interest fund.....		5,932.00
		6,945.80
General fund, overdraft.....		4,053.03
Secretary's balance, all funds, Apr. 1, 1929.....		2,892.77
County treasurer's balance, Apr. 1, 1929:		
General fund.....	780.82	
Reclamation fund.....	1,013.80	
Bond interest fund.....	5,932.00	
	7,726.62	
Less outstanding warrants, general fund.....	4,833.85	2,892.77
District indebtedness:		
Outstanding warrants, Apr. 1, 1929.....		\$4,833.85
Outstanding bonds, Apr. 1, 1929.....		10,000.00
Total.....		14,833.85

#### NORTHPORT DIVISION ON THE NORTH PLATTE PROJECT, NEBRASKA-WYOMING

(By Dr. Alvin Johnson, Associate Editor, Encyclopedia of Social Sciences, New York, N. Y.)

The writer of this report visited the Northport district in the last week of June and first week of July. The report is based on personal observation of the character and condition of the land and on facts gained from officials and former officials of the district and of the North Platte project, and through conversations with farmers and informed persons resident in adjacent territory, together with facts taken from official reports. The writer is under deep obligation to the officials of the Reclamation Bureau and the officials and residents of the district for their generous cooperation in supplying relevant material.

#### SUMMARY

It is generally agreed that the present condition of the Northport division is far from satisfactory. The principal items entering into the problem may be enumerated as follows:

1. A type of farming not well adjusted to the character of the land, resulting in low production and failure to build up the soil.

2. A condition of land tenures in which an undue proportion of the land is farmed by tenants.
3. A credit situation under which the water user is unable to cover adequately his legitimate credit requirements and is forced to pay heavy interest and commissions on such credit as he may secure.
4. A water supply exposed to unusual risk of interruption, and with charges uncertain and liable in any year to become crushing.
5. A highly irregular and unsatisfactory fiscal situation with the books of the district weighted down with delinquent taxes, in part uncollectible, and a habit established of anticipating all levies with warrants issued up to the legal limit.
6. Lack of efficient leadership and of organized public interest in the affairs of the district.
7. Discontent with government policy, and a fairly general sense that measures of relief are imperatively required.

#### I. FARMING SITUATION

The farming situation can be understood only when account is taken of the character of the land, and of the nature of its settlement.

About one-fifth of the land is virtually level; the rest is sloping, but not often with grades too severe for successful irrigation. The soil is prevailingly a light sandy loam, much of it wind deposited. On the level land and in depressions the soil is fairly rich in humus; on the ridges and exposed slopes it often appears like pure sand. The soil is underlaid by gravel or by clay at depths varying from 2 or 3 feet to 30 or more. The subsoil configuration does not, as a rule, lend itself to the formation of a water table accessible to vegetation. Hence successful tillage depends on the development of sufficient humus in the surface soil to retard the percolation of irrigation water to the lower levels.

Where the humus is deficient, a surface exposed by tillage, as in corn, potato, or beet crops, tends to blow seriously. On windward slopes two or three days of dry wind may entirely bury corn standing 4 inches high in listed rows. A season's winds may easily bury a line fence with a drift of sand and soil. It is a conservative estimate that three-fourths of the land in the district is subject to blowing.

Yet these extremely light soils show very good yields of alfalfa and sweet-clover, when adequately watered. If kept under such crops for a number of years, with abundant barnyard manure supplied, these soils can unquestionably be stabilized and made to yield satisfactory crops of beets, potatoes, small grain and even corn. In older sections of the valley there are farms now extraordinarily productive that have a record for blowing as seriously before they were stabilized by good tillage.

The problem of irrigating the prevailing type of sloping field in Northport presents certain special features. Very little leveling is required. But the farmer's main laterals, cutting through the light soil at a fairly stiff grade, promptly become gullies unless they are controlled by frequent concrete drops. These may represent a cost ranging as high as \$15 or even \$25 an acre. There appears to be a very serious loss of water in the field laterals. When the water is turned into them, much of it plunges straight down through the sand. The irrigator is compelled to watch his water more carefully and get it more promptly over the soil than in most other districts. He ought to begin watering earlier than the irrigator on lands with heavier soil, to press forward as rapidly as possible the net of rootlets in his growing crops. This implies an irrigator of energy and skill well above the ordinary level.

Not to pursue further this discussion of the character of the land, it is plain that the conditions of the soil demand a scheme of tillage based on hay, pasture and dairying or stock-raising, with only occasional row crops until the land has become stabilized by the formation of humus. They demand also unusually faithful and skillful irrigation practice.

The Northport division is an outstanding example of those projects in which the Government has supplied water to lands already settled. The number of unoccupied farm units was altogether negligible. Accordingly there was no possibility of selective settlement. The problem was one of making irrigation farmers out of a farm population without previous irrigation experience, and without any specified capital equipment.

Some of the settlers had entered upon their holdings in the eighties or nineties of the last century. More of the lands were homesteaded after the launching of

the Pathfinder Dam and in the expectation that water would be available in a brief period of time. The settlers lived by cattle raising, or by the precarious crops which could be produced by dry farming methods in years of unusual rainfall. The effect of such farming was to destroy the humus produced by thousands of years of prairie vegetation. The old fields of the district are notably inferior to those which have been recently broken.

Not until 1920 did water first become available for any part of the project. Many of the original homesteaders had become discouraged and had abandoned their claims to others equally devoid of capital; others, having patented their lands, sold them to speculators. Since the completion of the project no small number of farms have changed hands. It remains true, nevertheless, that the main part of the owner population comes down from the pre-irrigation period. These farmers have had to pick up their irrigation practice from the suggestions of the division manager, or from the advice of farmers in the older irrigated districts.

There is no doubt that the average farmer has made progress in irrigation technique. But he is still far from being an expert irrigator. A considerable fraction of the present body of farmers can probably never acquire the technique. Most of the farmers recognize that their husbandry ought to be based on live stock and hay; but of the owners not many can command the capital or credit that would be required to stock their farms adequately.

The best lands are almost all operated by tenants. Thus in Class I, 2,372 acres are operated by tenants, 285 acres by owners. Many of the tenants have been trained in irrigation practice in the older irrigated districts in the valley. They are not the best tenants in the valley, because the Northport lands are not so attractive, under the prevailing crop share plan, as some of the lands in other districts. Nevertheless, most of the Class I lands and also most of the Class II lands, are fairly well handled. They are, however, too generally cropped in beets for the permanent good of the land. Here, too, a development of stock raising would be desirable.

In summary, the Northport lands require unusually skillful handling, and an unusually large capital equipment of livestock. Many are in fact operated by men whose skill as irrigators leaves much to be desired (original settlers), or who have small incentive to handle the land well (tenants). So far as the owning farmers are concerned, very few of them can command the minimum capital required for carrying through a satisfactory live stock program.

It is this situation which accounts for the low productivity—\$20.99 per acre cropped in 1928. Even this figure exaggerates the prosperity of the district. It is swelled by the comparatively large figures (gross) for beets, which in many instances produce no net surplus above cost. An equal average from general farming would have indicated a far more prosperous community.

## II. LAND TENURE

Of the 14,743 acres for which figures are available, 9,739 are operated by tenants, 5,004 by owners, the percentages being 66 and 34, respectively. Of the Class I land 89 per cent is tenant operated; of Class II, 83 per cent; Class III, 72 per cent; Class IV, 37 per cent; Class V, 54 per cent.

The prevalence of tenantry in the first three classes is explainable in terms of the technique of sugar-beet production. Throughout the valley land capable of producing large yields of beets is held at higher prices than the working farmer can afford, and is parceled out to tenants who assume the risks of production and pay over to the landowner one-fifth of the beets. These tenants are not as a rule men who are climbing the ladder to ownership. Their ambition is rather to move from land which yields 10 tons of beets, which merely pays them a subsistence wage, to lands that yield 15 or 20 tons and comfortable profits. Their tenure is commonly for the year only, but in default of better openings they may remain year after year. Naturally they are held by contract to keep the soil in condition by rotation and manuring and by the proper application of water. Such contracts do not operate so effectively as the interest of the owning farmer. It is questionable whether this system can work to the permanent good of even the Class I and II lands in Northport, many of which are subject to blowing.

Class IV land, with 63 per cent operated by owners, and Class V land, with 46 per cent, are the strongholds of the owning farmer. Not much of the land of either class is suitable for beet growing. Class V land is rough and thin, and does not at present yield water charges together with a fair living for the owner or

tenant. It is, however, by no means so hopeless as Class V lands in many other projects. It is capable of producing fair yields of alfalfa and sweet clover. Both Class IV and Class V lands must depend mainly on dairying or stock raising for permanent solvency. A good living could be made on Class IV lands, adequately equipped with dairy herds and well managed, and a fair living on most of Class V. There is, however, hardly a single farm in these classes which is either adequately stocked or skillfully managed.

In sum the land tenure situation in Northport is very unsatisfactory. Even if all social and political considerations bearing on farm ownership are omitted, the technical character of the Northport lands is such as to make it highly desirable that the farmer should own the land he tills.

### III. THE CREDIT SITUATION

The total mortgage indebtedness of the water users in the Northport division stood at \$282,742 on January 1, 1929. Of this amount \$128,204 was held by banks and loan companies. The rate of interest ranges from 6 to 10 per cent, but very few loans can be negotiated at the lower figure. In general, chattel mortgages and short-time crop loans pay 10 per cent. Most mortgage loans from individuals pay 7 per cent, with commissions; some 8 per cent without commission. It is a safe estimate that the aggregate interest bill together with commissions amount to \$25,000 a year, rather more than twice the Government's construction charge.

As compared with the indebtedness of other rural communities, that of Northport is not crushing. It is probably not in excess of 40 per cent of the value of the real property of the community. The interest burden, however, is much too heavy. Probably at least \$5,000 could be saved if money could be supplied at a uniform rate of 6 per cent.

The banks of the valley, however, cannot supply money at a 6 per cent rate. They have been hard hit in recent years, and many of them are now closed down or in the hands of the State banking commission. Most of the remaining banks are burdened with frozen assets, and are trying, through conservative business at high rates, to recover their position. The Federal farm loan bank is averse to lending on irrigation district property. Its agent is reported to have stated that the bank regards the Government construction charge of \$70 an acre as a prior lien. This would of course eliminate any equity except on Class I lands, which are valued at around \$100 an acre. The Joint Stock Land Bank of Fremont takes the same position, and apparently other banks and insurance companies are doing the same. It may be assumed that the banks and loan companies, which now hold mortgages for \$128,204 will seek to collect as promptly as possible.

A dairy cattle loan association under the patronage of the Union Pacific has extended loans for building up dairy herds in some parts of the valley. Its funds are limited, and it does not take chances on a community whose finances are so embarrassed as those of Northport.

It is the literal truth that a Northport farmer, seeking to equip his farm with a dairy herd which would yield him an income sufficient to meet his obligations to the Government and at the same time build up his land, would be unable to secure credit for the purpose anywhere, even though he has a considerable equity in his place and is morally a good risk.

### IV. WATER SUPPLY

While the settlers in Northport once got on somehow without irrigation water, their whole scheme of life now depends on a secure and not too costly supply. Their present supply is neither secure nor certain in cost.

The water is delivered to Northport through the main canal of the farmers' irrigation district. Under the carriage contract, originally negotiated between the Government and the farmers' irrigation district, and transferred without modification to the Northport district. Northport receives 250 second-feet of water and meets one fifth of the cost of operation and maintenance of the farmers' main canal. In practice, the Farmers' Irrigation District Board makes up an estimate of the cost of operating and maintaining the canal and bills Northport for one-fifth of it. If the cost exceeds the estimate, a deficiency item is added to the following year's estimate for Northport; if the cost falls short of the estimate, a corresponding deduction is made in favor of Northport.

In the ordinary case, the carriage cost is around \$8,000, or about 50 cents an acre on the irrigable land in the Northport district. This charge, together with

overhead and maintenance of the district's own ditches, puts the ordinary cost of water at \$1.40 an acre—apart from construction charges. This is about 15 cents an acre more than other North Platte districts pay under the Government project.

The bookkeeping of the farmers' irrigation district is not sufficiently clear to show exactly what items go into the operation and maintenance of the main canal apart from the rest of the plant. But on the face of the figures it costs \$250 more per mile to operate the farmers' canal than the larger Government interstate canal, which roughly parallels it and through a higher and more difficult terrain. Nor does the farmers' district appear to spend so much on keeping its canal in good condition as does the Government. Accordingly, it is more than probably that Northport is being charged too much for the carrying of its water. The manager of the farmers' district does indeed assert that \$8,000 is too little; that the farmers' district loses money at that figure. His argument, however, is not convincing enough to deserve repeating.

Much more serious, however, is the constant risk that the farmers' canal may require important replacements at structures. One-fifth of the cost of these, under the carriage contract, must be borne by Northport. One such structure was replaced in the current year at a cost of about \$38,000, of which sum more than \$7,500 was billed to Northport, or approximately 50 cents an acre.

From the account of the condition of the farmers' canal given orally by Mr. Parsons, the manager, it appears that there are many weak points where serious breaks are possible. This opinion is confirmed by Government representatives in the valley. In the writer's judgment no prudent investor would buy land in Northport on any other assumption than that major repairs on the farmers' canal would involve Northport in expenditures averaging \$7,500 a year for the next 10 years. This means that the cost of water—apart from construction charges—is likely to be 60 cents an acre more than in other division of the project.

Moreover a serious break in the canal at the time of maximum need for water might destroy a whole season's crops. All irrigated agriculture runs some risk of this nature, but few main ditches have been permitted to fall into the condition of disrepair which characterizes the farmers' canal.

It has been indicated that the district of Northport is unable to check up the figures for ordinary canal costs, to determine whether they are reasonable. Neither is the district able to check up the cost of new structures, for which it meets one-fifth of the bill.

No doubt the Northport district could legally refuse to pay charges that appear on their face to be excessive, and force the production in court of the books of the farmers' district and their analysis by expert cost accountants. The Northport district has, however, no money for litigation. Furthermore, in its present weak condition the Northport district needs to keep in the good graces of the farmers' district. The farmers' district may by more or less intentional oversight fail to let the water come through to the Northport headgates. While Northport can force delivery through the courts, or through pressure applied under very uncertain authority by the superintendent of the project, who controls the Pathfinder water on which the farmers' district as well as Northport depends, precious time may be lost and growing crops may be severely damaged.

In sum, the water supply of the Northport district is expensive and precarious. The district will never be on a sound economic basis until its relations with the farmers' district have been regularized, either through court action or through Government intervention. Court action will remain impracticable until the financial position of the Northport district has been strengthened sufficiently to carry the cost of litigation.

#### V. FISCAL SITUATION

The gravity of the fiscal situation is sufficiently indicated by the figures for district tax delinquencies. The principal of such delinquencies amounted on March 15, 1929, to \$45,489; the interest computed to May 1, 1929, amounted to \$17,753, a total of over \$63,000.

With this very substantial sum to its apparent credit, the district is quite without cash to meet its own operation and maintenance, its payments to the farmers' irrigation district for carriage and its payments to the Government on construction. It is forced to sell warrants, secured on new levies. Its volume of warrants outstanding exceeds \$40,000 and tends to increase. It is



doubtful how much longer this situation can continue without forcing the district warrants to a discount, or destroying their market altogether.

In some cases the legality of the levies on which taxes are now delinquent is in doubt. In a larger proportion of cases, while the levies were unquestionably lawful, a drastic collection of delinquent taxes might involve the sale of the land for taxes. This is especially true in the case of Class V and even Class IV lands. These are the classes in which owner operation is most common. The board and the manager are naturally reluctant to force the foreclosure of these lands, having no certainty that the owners would be replaced by others more able to meet the district charges. Moreover, a question of fundamental justice appears to be involved. These farmers in many instances settled their lands in anticipation of a water supply, long before the water actually became available. In the period of waiting they exhausted their small capitals, their hopes and energies, and often the fertility of their soil. It would not reflect creditably on the management of the district if the coming of the water resulted in their final ruin.

But a very large part of the acreage on which taxes are delinquent is in Classes I to III; of the acreage in Class I, 43 per cent has delinquencies against it; 40 per cent in Class II; 52 per cent in Class III. Very little land in Class III is held at less than \$40 an acre; Class II lands may be conservatively valued at \$50 to \$75; Class I lands are worth \$100 an acre or more. It is unreasonable to suppose that the owners of these lands would fail to find the means to clear off the delinquencies if they felt that the district really meant to present the alternative of collecting or foreclosing.

Under the contract of 1926 delinquent charges for 1925 and 1926 to the United States were funded—that is, added to the construction charges; taxes levied to meet those charges were refunded to the taxpayer, if collected, canceled if delinquent. This unfortunate precedent has apparently much to do with the failure to pay up delinquencies on the part of those who are well able to pay. They hope that sooner or later a cancellation policy will be adopted by the Government. It is true that the delinquent taxes are due, not to the Government but to the district itself. The cancellation of back taxes would cut the ground from under the districts finances, without affecting the financial relation to the Government. But the delinquent taxpayers do not always draw these distinctions.

No doubt a strong management of the district could force collections in spite of the disposition of the taxpayer to procrastinate in the hope of relief. The district does not now enjoy a strong management. Of the three members of the board, two, while honest and honorable men, are themselves delinquent taxpayers. The manager holds office through appointment by the board, and would obviously be hampered in his efforts to clear up delinquent taxes by their situation, even if he earnestly desired to force collections. He would moreover become extremely unpopular. Under the contract with the Government he is indeed subject to removal by the Secretary of the Interior if his management is unsatisfactory. But the Secretary is far away and the delinquent taxpayers are at his door.

#### VI. LACK OF LEADERSHIP

One fails to discover anywhere in the district evidence of the existence of strong leadership. The impression given by board and manager is one of drifting and bewilderment. The superintendent and the counsel of the North Platte project have given much excellent advice on fiscal policy—advice which, if followed from 1926, when the contract was drawn, would have established the finances of the district on a sound basis. The district has failed to develop or support leaders who either could or would follow sound advice.

Undoubtedly there are stronger men in the district than the present board membership. But the water users at large exhibit the most complete apathy toward the management of district affairs. Only a handful turn out for district elections, and the choice of board members is a matter of chance, somewhat guided, apparently, by the intervention of influences that do not wish a strong policy adopted.

In the nature of the case leadership must be assumed by the manager. A board consisting of hard working farmers, even if representative of the best material in the district, could hardly be expected to conduct directly the management of an enterprise on which the fortunes of every water user are dependent and in which the Government has a nominal investment of over a million dollars. The board can properly be expected to function only as a lay element, legally

responsible for action based on the expert recommendations of a professional manager. It does not now enjoy such expert management.

#### VII. ATTITUDE TOWARD THE GOVERNMENT

It is often alleged that the Northport district is seething with discontent over the policy of the Government, and charges the Government with failure to live up to its promises. So far as the latter charge is concerned, the investigator failed, after diligent inquiry, to find any foundation for it.

The board, the manager, the counsel for the district, and many of the water users, are insistent upon the need of a 10-year moratorium on construction charges. It is probably true that the majority sentiment of the district supports this demand. Conversations with water users, however, indicated that the community is by no means clear as to the practical effect of a moratorium. What the most embarrassed fraction of the district, the operators of Class V and Class IV lands, desire, relief from operation and maintenance charges, could not be attained through a moratorium on construction. Neither would the tenants, who make up the majority of the operators, receive the slightest benefit from a moratorium of this character. The lion's share would go to the owners of the land in Classes I, II, and III. It would raise the price of these lands, no doubt, but it would have no effect on tenures nor on the character of tillage.

Nor would a moratorium necessarily strengthen the financial position of the district as such. The owners of the good lands would no doubt be better able to clear off their delinquent taxes, but it does not follow that they would do so unless compelled by a management strong enough to compel them to pay with or without a moratorium.

Naturally, within the district and outside of it there are many who feel that any payment to the Government withdraws funds from the valley and is therefore undesirable. Not much weight, however, should be given to this purely localistic and theoretical view.

#### CONCLUSION

Economically, fiscally, socially, and politically the condition of the Northport district is decidedly unsatisfactory. If a final judgment were to be drawn at the present time as to the wisdom of using reclamation funds for the creation of this district, this judgment would necessarily lean toward the negative. Northport is not such a community of prosperous, happy, independent home-owning farmers as the Government should spend money in establishing.

Only nine years have passed, however, since water first became available, and more than nine years are required to transform a community of dry farmers into efficient irrigators. Is it not possible that when the district has had 10 years more of experience, most of the difficulties analyzed above will have disappeared, without any action on the part of the Government?

This is indeed possible. It is also possible that the situation may go from bad to worse. Indeed, this is probable, so far as the fiscal situation is concerned, and the fiscal situation is crucial for the credit and the spirit of the community, public and private. As has been indicated, the warrant indebtedness of the district tends steadily to grow; by the end of the present calendar year the district will have issued warrants up to the legal limit on the levies collectible May 1 of next year. If a bad break occurs in the farmers' irrigation district canal the Northport district will be obligated to pay a large sum for which it has no funds whatever available. In the circumstances, it is not only possible, but probable that the district will repudiate the construction charges due the Government under the contract now in force.

By the terms of the contract the Government may refuse to supply water if the construction charges are not paid. If it did so, and restored Northport to the desert, a flame of anti-Government sentiment would run through the whole North Platte Valley. It would not be surprising if something in the nature of a strike against the Government occurred, every district refusing to pay its construction charges. If the Government continued to supply water in spite of the repudiation of construction charges, every other district would cry out against the discrimination and would seek relief from its own burdens.

In the light of these considerations the problem of the Northport district must be regarded as potentially grave, deserving special consideration quite apart from the general problems of reclamation and settlement.

## RECOMMENDATIONS

(a) It is the judgment of the investigator that the proposed moratorium on construction charges, the only proposal the district itself has seriously advanced, would offer no substantial relief. The payment of \$12,000 to the Government is a relatively small item among the burdens under which the district labors. Moreover the benefits accruing from a 10-year suspension of construction charges would accrue mainly to the owners of the better lands, which are almost all tenant farmed. It would not benefit the owners of Class V lands at all, and would benefit those of Class IV lands insignificantly.

If the demand is to deserve any consideration at all, it should be amended to involve the strict collection of all construction payments and their application in relief of operation and maintenance charges, which rest equally on all acreage, but burden the poorest lands most heavily.

(b) The first objective of Government policy should be the increase in the productive power of the district. Here an improvement in the credit situation is vital.

As has been indicated above, the securing of loans on land at a reasonable rate is greatly hampered by the widely accepted assumption that the Government construction charge of \$70 an acre is a prior lien to be taken at its face value. The assumption is indeed without warrant either in law or in financial fact. The present value of the Government claim upon the land is not \$70 an acre, but about \$20 an acre. But this consideration is immaterial so long as the Federal land bank, the joint-stock land banks, the loan companies, and the entire local community measure the burden by the nominal value of the construction charge.

It would vastly improve the land-credit situation of the district if the Government should substitute for its nominal construction charge an interest-bearing bond with a face value equal to the present value of the prospective payments on construction. This present value is probably not more than \$20 an acre on the average. A professional accountant would, however, determine the exact amount; the bond would bear the same rate of interest as was employed in computing the present value. Naturally, the burden would rest unequally on the acreage, according to class, ranging perhaps from \$10 to \$40 an acre.

It is obvious that such a substitution would cost the Government not one single dollar. The district would indeed have every incentive to anticipate its payments in order to save interest and if this were done the aggregate interest and principal payments might not foot up to \$70. If, however, the Government chose to spread out the expenditure its revolving fund, as under the present contract, it would only need to invest part of the payments in its own securities. It could thus assure itself of the nominal value of its construction charge, within the same number of years.

While the Government would lose nothing by such a rearrangement of its construction repayment contract, the district would gain enormously. Every landowner would feel that he had only bonds ranging from \$10 to \$40 an acre against him, instead of the \$70 at which he now erroneously estimates his burden. He would feel himself in a privileged position in comparison with the farmers' irrigation district water users, who have against them bonds of \$50 an acre. There is hardly a non-Government district in the valley which is not bonded more heavily than Northport would be under this plan.

The effect on the lenders of credit would be notable. Instead of gaging the farmer's equity by the excess of the value of his land above \$70 (in a majority of cases nil) they would gage it by the excess over the bonds resting on his acreage—in almost all instances a substantial sum. The buyer of land would likewise revise his estimate of the burden resting on it. At present he assumes that Northport lands are heavily burdened by construction charges, and as a consequence there is virtually no movement of land in Northport, no replacement of incompetent owners by competent ones. This situation would be promptly remedied by the reform here proposed.

The investigator has suggested this plan tentatively to some of the most active leaders of the movement for a moratorium. They agreed not only at once, but on mature consideration, that such a plan would represent a greater measure of relief to the district than the moratorium. They agreed that it would improve the credit of the district to such an extent that the savings through lower interest might soon be equivalent to the present construction charge.

In drawing up the terms of such a revised contract, the Government could fix the initial payments at modest figures, since any deferred payment would be funded into an interest bearing obligation, not, as now, into one which bears no interest and therefore presents a perennial temptation to postponement.

Furthermore, any petitions from the district for additional Government services as, for example, for drainage, would be controlled by the consideration that the cost would be merged into the interest bearing debt.

The Government would naturally permit the district either to anticipate payments or to invest in its own bonds, with a view to meeting unforeseen emergencies. At present many reclamation districts carry surplus funds, which are not in all cases too safely handled. They are reluctant to use them in anticipation of Government charges, because they receive no allowance for interest. With the proposed change in the form of contract, the whole community would regard it as good business to anticipate Government charges and thus reduce the interest burden resting on the district.

(c) While cheaper and more adequate land credit is of enormous importance to the district, it would solve in only a minor degree the problem of supplying credit for the financing of dairying and stock raising, the only secure basis of prosperity on a majority of the lands of the district. There are at present no adequate private supplies of such credit. Therefore it should be considered seriously whether the Government, having launched the district and therefore having a permanent interest in its prosperity, should not itself supply the needed credit through reclamation funds, as contemplated in the Kendrick-Winter bill.

It goes without saying that the Government should not supply credits unless a machinery of administration could be set up which would insure their safe and judicious placing. It does not appear, however, that the problem of devising such machinery is one of insuperable difficulty. The following tentative plan may be suggestive:

Set up a board of three, consisting of the manager of the district, the counsel of the project, and an agricultural adviser, supplied to the district if possible by the Department of Agriculture, or by the State Agricultural College.

Loans would be made only for specific purposes, investigated by the agricultural adviser and approved by the board.

It may be noted, first, that such a machinery would operate toward encouraging farm ownership, since stock and improvement loans could not safely be extended to tenants on annual or other short term tenure.

Further, it may be noted that such a plan would not only supply the district with an agricultural adviser to make suggestions as to improvements in technique, but it would place him in a strategic position for insisting on good technique, such as no adviser without visible function would hold.

(d) The Secretary of the Interior should make an official inquiry into the administration of the present manager of the district, and if convinced that he is not managing the finances of the district with the vigor that the case requires, should insist on his removal and replacement by a stronger man. It would be desirable, however, that such action, which might increase the unrest of the district if taken alone, should be accompanied by positive measures such as have been indicated above, toward improving the economic position of the district.

(e) The Government should take account of the fact that the Northport district, being supplied with water through the farmers' canal, is at a disadvantage as compared with other districts established on Government projects, and should endeavor to assist the Northport district in securing a revised carriage contract at a fixed charge which the Northport district can bear, in place of the present indefinite and fluctuating charge.

The writer of this report is aware that the two of his recommendations which are most vital, namely the revision of the contract and the supplying of loanable funds, can be realized only through new legislation. But he believes that the situation of the Northport district is actually so discouraging to the water users, and potentially so dangerous to the prestige of the Reclamation Service, that the department ought not to shrink from the effort of securing such legislation.

It may be said that if such legislation were enacted in favor of the Northport district its benefits ought to be extended to all Government projects. The writer does not propose so ambitious a program, but he ventures to suggest that if every project without exception transmitted its present plan of construction payments into a present-value interest bearing bond, the position of both the districts and the Reclamation Service would be immensely straightened. And the same thing would be true of the generalization of a plan of stock and improvement credit, so administered as to make a functional place for an export agricultural adviser and to favor the development of owner operation instead of the system of permanent tenancy which now tends to fasten itself upon reclamation lands.

## UMATILLA PROJECT, OREGON

## EAST DIVISION (HERMISTON IRRIGATION DISTRICT)

(By H. J. Ott, E. L. Jackson, F. L. Jewett, T. W. Botkin, and New Madden)

## 1. INTRODUCTION

In the spring of 1929 the settlers of the east division of the Umatilla project assembled at a meeting of the Umatilla Project Farm Bureau, appointed a committee composed of Henry Ott, F. L. Jewett, and E. L. Jackson to find ways and means of bettering the present serious condition of our farmers, and this committee requested that this project be included in the economic survey of projects to be held this summer.

Dr. Elwood Mead, Commissioner of Reclamation, in answer to this request, replied that it was impossible to make any changes in the plans for the economic inquiry, but that if this committee would prepare a full statement of the economic problems of the project it would be considered as carefully as if some one had been sent here to collect the information.

This committee appointed by the farm bureau and assisted by the board of directors of the Hermiston irrigation district, has prepared this report.

## 2. EARLY HISTORY OF PROJECT

The project was first investigated by F. H. Newell, head of the Reclamation Service, at the request of citizens interested, and before the construction of the project began, agreements were entered into to pay for the works the sum of \$60 per acre in 10 annual installments of \$6 each and an annual operation and maintenance charge of \$1 per year the first year and \$1.30 per year thereafter. The lands included in the project were both Government and privately owned. The first settlement began in the year 1908 and the prices at which raw lands were sold varied from \$50 to \$250 per acre. Irrigation water was available for the first unit in the spring of 1908. Settlement of all farm units followed rapidly so that in the two or three years following a resident owner was living on practically every homestead and desert claim, and much of the privately owned land was settled and improved. This early settlement of the project was caused by the statements made by the Reclamation Service assuring prospective settlers that 2.8 acre-feet of water was ample for raising crops; that for the \$60 construction charge water would be delivered to each 40-acre tract; that the soil was a rich volcanic ash suited to the growth of orchard and vine crops, and that from 10 to 20 acres was adequate to support a family.

Most of the early settlers had sufficient capital and spent it lavishly in trying to grow orchards and other crops, but unsuccessfully. It seemed that the man who had capital spent and lost it all, while the few with little or no capital had to work for those who had and were just as well or better off in the end.

## 3. CONSTRUCTION AND OPERATION AND MAINTENANCE CHARGES

The record of payment of construction charges of \$6 per year was good for two or three years, but most of those early construction payments were paid out of capital, not from the proceeds of the farms.

It was soon found that the people could not pay an annual charge of \$6 per acre and the payments were changed to a graduated scale about the year 1912, making the first few of the 10 annual payments small, and the last few large, but even then there were many delinquents, and those who took advantage of the graduated scale of payments were charged an additional \$10 per acre for the privilege. Even with graduated payments the settlers fell behind in their payments from the start and Congress passed the 20-year extension act, approved on August 13, 1914, under which construction charge payments were extended over a period of 20 years in graduated installments of 2 per cent for four years, 4 per cent for two years, and 6 per cent for 14 years, with a penalty of 1 per cent per month for any installments not so paid.

Under this extension act the charges for construction and for operation and maintenance were never fully paid when due, and in 1921 immediately after the organization of the Hermiston irrigation district, a new contract was made whereby that district assumed liability for the total construction and all operation and maintenance charges and were given 20 years from the date of the contract

for payment according to the terms of the extension act. At that time the amounts which the district agreed to pay were as follows:

Construction charge.....	\$805, 577. 46
Improvements and reconstruction.....	760, 000. 00
Deficit in operation and maintenance, 1914 to 1920, inclusive.....	26, 734. 87
Deficit in operation and maintenance, prior to 1914.....	91, 083. 35

The last three items were called "supplemental construction charges" and were not to be payable until after the 20-year period.

It was also claimed by the Reclamation Service at the date of that contract that it had expended \$479,531.41 for construction and operation and maintenance over and above the amounts which the district in the contract agreed to repay.

It will be seen from the above that practically every year after the opening of the project there was a deficit in the amounts due for construction and for operation and maintenance. In other words, it has never been demonstrated by the Government that the projects lands could pay the current construction and operation and maintenance charges.

At the time of making the last mentioned contract the uncollected accrued construction charges and penalties up to May 31, 1921, amounted to \$23,000 and the uncollected accrued operation and maintenance charges to said date amounted to \$38,000. A supplemental contract for the payment of these amounts was made on June 8, 1922, whereby the district was given six years in which to pay these delinquent charges, beginning in 1923.

Then after the passage of the act of December 5, 1924, known as the fact finders act, a new contract between the Secretary of the Interior and the district was entered into on June 23, 1926, by the terms of which the district assumed the operation of the project system and the payment of the amounts specified in the 1921 contract were to be made in annual installments of 5 per cent of the average gross annual acre income of the lands in cultivation in the project over the preceding 10-year period. Penalties were reduced to one-half of 1 per cent per month.

The lands of the project were then classified and 11,043 acres were classified as productive land, 596 acres as temporarily unproductive, and 4,767 acres as unproductive and nonirrigable. The owners of these unproductive, or class 6 lands, were repaid the amount they had paid for construction, less accrued operation and maintenance charges, and their water rights were canceled.

The record of construction charge payments is as follows:

Paid prior to 1926.....	\$264, 584. 60
Paid since 1926.....	33, 596. 45
Total.....	298, 181. 05
Present delinquencies:	
1927, 5,960 acres.....	\$11, 428. 29
1928 (first half), 10,719 acres.....	9, 647. 10
Total.....	21, 075. 39

Since the 1926 contract the charges for construction and for operation and maintenance per acre per year have been as follows:

1926: Construction, \$2.05; operation and maintenance, \$2.40.

1927: Construction, \$1.95; operation and maintenance, \$1.90.

1928: Construction, \$1.80; operation and maintenance, \$1.90.

The total unpaid construction charge amounts now to approximately \$97 per acre.

#### 4. TAXES AND OTHER CHARGES

The lands within the project are subject to State and county taxes of approximately \$1.50 per acre per year.

Probably the interest charges on mortgage and other indebtedness will amount to an additional \$4.50 per acre per year. Practically all the land is now in private ownership and taxable.

#### 5. IRRIGABLE ACREAGE

The project works and system were constructed to irrigate 22,000 acres. At the time of the 1921 contract we find this number has shrunk to approximately 17,000 acres and at present we find the irrigable acreage to be only 11,131.52 acres.

The number of acres actually cultivated for the last three years is as follows:

1926: 7,642 acres.

1927: 7,116 acres.

1928: 7,124 acres.

We have to maintain the same diversion dams, feed canal, reservoir, and practically the same distribution system which were constructed to irrigate 22,000 acres, to irrigate the 7,002 acres in cultivation in 1929, and the cost of this maintenance and the expense of distributing the water must be borne by the lands in cultivation.

There have been in the past many more acres in cultivation than at present, and the reason why no more are in cultivation now is that it is not profitable to the owners to put any more in cultivation under present conditions.

#### 6. COST OF FARMS

The first cost of the various farms on the project varies from nothing for home-steads to \$250 per acre for raw land.

The buildings on all of the farms are of frame construction and the houses are generally small, of low cost but fairly comfortable. There are very few large barns and most of the barns are merely sheds. The farm equipment on the project is estimated to be worth about \$44,000.

#### 7. CLASS OF FARMERS

A large percentage of the original farmers on the project were inexperienced in irrigation and were attracted to these lands by the literature put out by the Reclamation Service. They had considerable capital. The present farmers are, in our opinion, 90 per cent capable and efficient, but are lacking in capital. About 26 per cent are renters.

#### 8. PRICES OF LAND

At the beginning of the project land sold for from \$50 to \$250 per acre, but it is not now considered that raw land has any value and it can not be sold. Raw land can now be had for accrued taxed and water charges. Land with considerable improvements and cultivation can be bought for from \$50 to \$100 per acre, and on almost any terms.

We estimate the present cost of developing new land to be as follows:

	Per acre
(a) Cost of land, taxes, and accrued water charges.....	\$20
(b) Leveling and seeding.....	100
(c) Building, fences, well.....	80
(d) Farm equipment.....	20
Total, per acre cost.....	220

The cost of leveling the land is very high, owing to the unfavorable topography and the tendency of the loose soil to blow. The new settler on a 40-acre tract needs \$5,000 in cash, and credit for a like amount running for long time at a low rate of interest. No credit can be secured by the settlers here at the present time, as all loan agencies have refused to accept these lands as security. If credit could be provided, we think it should come from the Federal Government.

There is no present demand for raw land. Few have the necessary capital and credit and none seems to be willing to undertake the new development under present conditions.

#### 9. SOIL

The soil was recommended by the Reclamation Service as being a volcanic ash and very fertile. Experience has shown it to be very sandy and porous and infertile.

In the beginning settlement was effected rapidly. The original settlers, in the main, had sufficient capital and believed they could make a living and pay all water charges, from the soil. Taxes were low at that time and credit was easily secured, as the loan agencies had not found out by experience that the security was not satisfactory. Health conditions on the project have been above the average, and while rabbits and insects have caused some damage, they did not affect the early settlement. Markets for products have been usually good. Portland is 200 miles away. Transportation is favorable. The project has never lacked for expert advice, as this has always been available through the county



agents, and excellent service has been rendered by the Oregon Agricultural College experts and the local experiment station. At present diversified farming is followed and the two major operations are chickens and dairying. From 15 to 40 acres are necessary, per family, according to what program is followed. However, diversification is difficult, owing to the heavy winds and light soils.

#### 10. CROP RETURNS

The per acre values of the crops grown on the project in the year in 1928 are as follows:

Alfalfa-----	\$20	Oats-----	\$14
Apples-----	19	Hay (other than alfalfa)-----	9
Barley-----	13	Pasture-----	11
Corn-----	27	Potatoes-----	40
Corn fodder for ensilage-----	35	Wheat-----	12
Gardens-----	79	Miscellaneous (only 21 acres)-----	197
Small fruits-----	106		

The average per acre value of all crops in 1928 was \$19.68.

#### 11. NEEDED CONSTRUCTION AND REPLACEMENTS

Under the contract of 1921 the United States agreed to expend the sum of \$780,000 in reconstruction, additional laterals, and betterments, and a considerable amount of this sum has not been spent, and the Reclamation Bureau refuses to expend any more.

The system which was turned over to the district in 1926 was supposed to be complete but we now estimate that an expenditure of about \$52,200 will have to be made within the next five years to replace worn-out or faulty construction.

This estimate is itemized as follows:

"M" canal, 9,000 feet lining-----	\$27, 000
"M-R" lateral, 8,000 feet lining-----	5, 000
"I" lateral, 225 cubic yards at \$16-----	3, 600
Feed canal, clean and patch-----	5, 600
Flannigan pipe, replace-----	2, 000
"K" line, replace-----	9, 000
Total-----	52, 200

This will necessitate an assessment of \$1.49 per acre per year upon the 7,000 acres in cultivation, besides the annual assessment for operation and maintenance. Any unusual break or accident to the system is likely to cause other considerable expenditures at any time. The regular budget for operation and maintenance is about \$14,000, or an assessment of \$2 per year on the 7,000 acres, which will pay. Much of the construction and replacement outlined above is needed now and at present there is no way of meeting the expense except out of operation and maintenance funds.

#### 12. NECESSITY OF A COMPACT PROJECT

The project distribution system was originally constructed to irrigate 22,000 acres of land. This irrigable acreage had been gradually reduced to approximately 11,000 acres called irrigable, and approximately 7,000 acres actually in cultivation. The location of the lands in cultivation is such that the entire system must be maintained to carry water to them. Conditions are not favorable for the improvement of the lands classed as irrigable but not in cultivation. These lands were left uncultivated on account of poor topography, heavy grading necessary, and other causes and will eventually eliminate themselves unless much more favorable conditions intervene. It will be impossible for the district indefinitely to maintain and reconstruct the present long system to get the water to these outlying lands. When the present system to them wears out, the district can not raise the money to reconstruct the miles and miles of pipe lines and ditches necessary to deliver water to the ends of the system. The time will come before very long when these outlying lands must be eliminated from the project, and some method must be devised to eliminate them. We can find no way of doing this except for Congress to provide funds to purchase and cancel the water rights.

## 13. RESPONSIBILITY FOR PRESENT CONDITION OF PROJECT

Following are some of the unfavorable factors contributing to the present adverse conditions on the project, and reasons why more land is not cultivated:

Lack of fertility of the soil.

Sandy and porous condition of the soil.

The extreme tendency of the soil to drift when worked.

Unfavorable topography necessitating heavy grading.

Heavy duty of water and necessity of frequent irrigation.

Killing frosts in late spring and early fall.

Extreme heat in summer and extreme cold in winter.

High cost of production and low value of products.

Insecurity and instability of future project conditions.

Depletion of cash and credit, lack of income.

High taxes, including construction and operation and maintenance charges.

It has been the uniform experience of the settlers that the soil in its original state, lacks fertility for the profitable production of cultivated crops. The early efforts were directed mainly along the lines of the production of fruit and truck crops. These efforts proved entirely futile in most cases, as some of the apple orchards never produced a crop, late spring frosts would regularly freeze the fruit, and peaches, berries, and the early blooming fruits have been almost entirely abandoned. After the failure of fruits and truck crops, the settlers turned to alfalfa, but it is now generally recognized that alfalfa for market can not be produced profitably on these small farms in competition with the large farms of other districts where the cost of water and production is much lower. The securing of an original stand of alfalfa is expensive, and for some reason after five or six years the yield gradually drops until the cost of production becomes higher and higher. After the land has been in alfalfa it is more fertile, but after plowing the land is subject to erosions and drifting and must be regraded at considerable expense at each operation. Due to the extreme porosity of the soil irrigation must be frequent.

The project was settled in the beginning because the people believed that because it was a Government project the water supply would be good, the duty of water would be low, and the lands would be fertile. The Reclamation Service reported that the soil was fertile, of volcanic ash; that 28 acre-feet of water per acre was sufficient for crops; that the land was adapted to the growing of orchards, vine crops, and small fruits; and that from 10 to 20 acres was ample for the support of a family; also that the cost of the water right was \$60 per acre. Even before the opening of the third unit, now commonly called "The Sand Hill," soil experts from the Department of Agriculture reported that the soil was infertile and very porous, but these reports were evidently not considered by the Reclamation Service. However, those same lands have since been classified by the Government as infertile, unproductive, and not susceptible of successful cultivation and have been eliminated from the project, but not until after the settlers on them had lost their life savings and the most productive years of their lives in trying to make homes for their families.

We believe now that the project should never have been constructed. The land was too rough, infertile, sandy, and porous to be adapted to successful development. We believe that the Reclamation Service is responsible for the wasteful expenditure not of public money, but of the savings and earnings of the settlers. The main object of the settlers has been to make homes for their families on farms which they could make support themselves and families. The settlers now here still have their homes and desire to keep them and we believe that conditions should be made such, as far as it is possible, that they can retain their homes and support their families on them. A great mistake has been made, and the Government is mainly responsible for it.

In the above this committee has tried to show the actual conditions as they exist; also, to answer as nearly as possible the questions contained in the questionnaire prepared for the economic committee recently appointed by the Secretary. The questionnaire was general and did not fit our conditions as well as it might have, had this been the only project under consideration.

Summing up the whole matter, this committee believes it only fair that all parties concerned admit that the project should never have been constructed. Before construction was ever started, the Government should have made a study of the soil, and if they had done this it would have been found that it would cost more than the land would ordinarily have been worth to bring it to a state where it would produce profitably. A study of the topography should have been

made, and if it had been made by anyone with experience, it would have been found that it would again cost more than the land would ordinarily be worth to bring it to a state where it could be irrigated. It is a singular circumstance that all of the projects adjoining this one on all sides have very much better soil and topography than this, although this was the first one constructed, in other words a local comparison would have shown the futility of building this project.

Even after this, as the work progressed, on account of inexperience and lack of knowledge of irrigation, the Government built miles of ditches at heavy cost which were later found to be impractical and water was never turned into them. Many concrete structures and many pipe lines were constructed and never used. These errors had nothing to do with soil or topography and were engineering mistakes. Later on the Government furnished an expert irrigation manager, and through lack of knowledge of this kind of soil, he had many farmers change their whole irrigation systems and arrange them for a continual flow of water. This was unworkable and these systems had to be again rebuilt at heavy cost to the land owners, and so it continued year after year, trying one experiment after another, producing failure after failure.

Irrigation was just as new to the people of the United States when this project was originated as it was to the Government and probably more so. The average man knew nothing about it. There was no objection to the price of the land being \$200 per acre because it was represented the land would produce from 5 to 9 tons of alfalfa per acre and at the same time this procedure would put the soil in condition to produce tree crops of high value. There was no question raised as to the size of the farm unit as the Government had platted its lands in tracts of from 10 to 40 acres, each one being of sufficient size to maintain a family and make a profit in addition. The difference in size of the farm units was arrived at by location, those close to town being 10 acres and the size larger as the distance increased. The size has nothing to do with the soil or other farming conditions. There was no question raised as to water as the Government advertised it would require 2.8 acre-feet and the storage was ample to furnish this amount. The cost of water was not questioned as the amount was set at \$60 per acre.

These costs were small in comparison with returns settlers were led to believe they would be able to get. The Government Book of Information sent out under date December 15, 1909, states: "Results and Profits. As these lands have not been settled long enough to show average results for a term of years, for such data we will have to go to the neighboring tracts of irrigated land." Hood River apples from \$500 to as high as \$2,500 per acre; \$1,320 net per acre from pears in Wenatchee; \$700 per acre net from apricots in Wenatchee; \$3,500 per acre for pears at North Yakima on land purchases but six years before at \$200 per acre; \$2,784 per acre on dewberries near Hermiston; average of \$2,200 per acre on peaches at North Yakima in 1907. This same book quotes the price of land at from \$100 to \$250 per acre. Why would not inexperienced people pay this price for land if the Government advertised the price and quoted the earnings on similar land as above. Under these circumstances the project was quickly settled, the Government putting 30 families on one section of homesteads.

After 20 years of experience, and after trial after trial of all kinds of farming, we are forced to the following conclusions: That the Government was wholly inexperienced and pitifully ignorant of the actual conditions of this project in its earlier years; that thousands of dollars were expended on works that could never be used or realized upon in any way; that thousands of dollars have been expended on works that have either been replaced at heavy cost or must still be replaced; that miles of ditches and pipe lines were built through lands which were absolutely worthless and could never be profitably farmed; that we have a distribution system long enough in miles for the original 22,000 acres, now being supported to actually irrigate 7,000 acres; that hundreds of men and women moved onto these lands and wasted the best years of their lives, had to fail, and now have left, penniless and enemies to irrigation; that the greatest loss has been the suffering caused by reason of a people trying year in and year out to do something that was impossible; that the money expended by the settlers was a great many times more than the total cost of the project to the Government; that the soil is not capable of heavy production; that the only safe kind of farming is dairying and poultry farming which will not permit of heavy overhead expenses and operating costs; that the rosy pictures of the high yields can never be realized; that the size of the project has steadily reduced in cultivated area until it is but 7,000 acres, less than one-third its originally intended size; that although the district operates as economically as possible, our operation

and maintenance cost is from \$2.40 to \$1.90 per acre per year; that after paying all we could possibly pay during the past 20 years, our building charge is yet an average of \$97 per acre, notwithstanding the fact that it was to be but \$60 per acre; that a large part of the building charge paid to the Government has been capital funds and not produced from the land; that almost all of the original annual payment of \$6 per acre was capital funds, and since payments have been reduced and extended we find the landowners getting farther and farther in arrears in their taxes; in fact, we have a number who have been unable to pay the annual maintenance charge; that although the district has operated but three years it is now ready to take over the title to 1,600 acres of lands already abandoned and there are many more acres subject to foreclosure; that values are steadily shrinking; that crop returns per acre are steadily growing less; that farm and school population is steadily getting less; that on careful survey we find but three comparatively young farmers on the project; that the farm buildings and equipment are becoming run down and are not being repaired and replaced and kept in condition; that practically every farm is for sale; that there is no sale for land at all; that the Federal land bank is refusing loans and foreclosing mortgages (private loan companies quit some years ago); that we have a case in point under date July 30, 1929 in which a Federal land bank loan was paid in full amounting to \$3,000, the borrower holding stock for 5 per cent amounting to \$15 and the bank is now offering this borrower \$30 in payment of his stock, making the bank's estimate of the value of the local association stock to be 20 cents on the dollar.

This committee has recently had the opportunity of showing the project to Mr. Kreutzer, director of reclamation economics. He now has personal knowledge of the physical condition of at least some of its works; he has had opportunity to see the run-down condition of the project as a whole; he has had opportunity to personally interview the two outstanding owners of the two best farms on the project, men who have lived and farmed here many years. We believe he now has personal knowledge of conditions as they exist here at the present time. Regardless of who or what was originally at fault on this project, we believe you must realize with us that the time has now come when we must have relief. You must realize with us the great injustice that has been done and the inability of any of us to go back and correct it. No one now living can say with certainty that the district can go forward indefinitely under any conditions, but it must be apparent to all that there is not the slightest reason why further losses and suffering should be caused by the further collection of money for building charges.

We believe the present executives of the Bureau of Reclamation have enough personal information to know our almost exact condition. We believe the committee recently named to make a report on this project have all the personal information that any of us have, consequently we believe the facts recited above are known to them almost in detail, therefore we ask and recommend that the building charge on this project be discontinued from this date.

In again calling attention to the fact that soil conditions and crop production never were such that the successful operation of the project could be assured, the committee believes that construction charges collected in the past were harmful and unjust to the permanent home-seeker. Many settlers have spent the productive part of their lives here to make a permanent home and now have no other recourse than to hang on to the last, and furthermore, most of them desire to retain their present homes. Their homes are just as uncertain as the successful continuity of the district. Settlement has shrunk to the danger point and the increasing tenancy means ultimate abandonment, if present conditions continue.

Our present rate of operation and maintenance is as high as seems advisable, and this committee, after due consideration, hereby requests repayment of construction charges previously paid in, to replace faulty construction and for reconstruction needed now and in the future.

## WEST DIVISION, WEST EXTENSION IRRIGATION DISTRICT

(By A. C. Houghton, manager)

### INTRODUCTORY

This survey was prompted by the consideration by the board of directors of this district of the deplorable and serious economic condition of the west division of the Unatilla project.

A list of questions, pertaining to economic conditions on the various irrigation projects, was submitted to the directors of this district by Dr. Elwood Mead, Commissioner of the Bureau of Reclamation.

On July 6 of this year Mr. George Kreutzer, director of reclamation economies, met with the board of directors and later accompanied by them visited certain parts of the project. Suggestions were made by him as to the text of information desired in this report.

There were appointed by the irrigation directors, shoe personnel consists of A. E. McFarland, C. E. Glasgow, and Leslie Packard—three water users from different parts of the district—W. B. Walpole, W. O. King, and T. E. Broyles. By these six men this investigation and report were made.

Inspection was made of alkali lands in the vicinity of the town of Boardman and in the so-called Kern district near irrigon, of a few farms in the best state of cultivation of any in the district, and of typical examples of lands undeveloped and uncultivated—several farmers were interviewed in various sections whose places showed a variety of soil conditions and crop returns—and statistics as to mortgages, county taxes, water charges, interest paid, delinquencies in assessments and county taxes, and other facts pertinent to this investigation were gathered and examined.

In the foregoing report no direct answers to the list of questions submitted by Doctor Mead are made, but the conclusions were reached through the use of this questionnaire.

The committee considered the main point of this investigation to be:

1. How much of the cultivated and irrigated lands will continue in a productive state?
2. Can, or will, any of the undeveloped and nonirrigated lands be brought under cultivation to take the place of lands that have become and are increasingly becoming alkali, and of lands that have been abandoned on account of insufficient revenue derived from same to pay the owner to either farm or lease? If these undeveloped lands would be productive, would the expense justify such improvement under present agricultural and industrial conditions?
3. Can the district expect to pay the yearly construction charge or any part of same, and at the same time provide adequately for present and future operation of the project?

#### I. IRRIGABLE ACREAGE

The original acreage of the west division of the Umatilla project for which the main canal construction was intended consisted of 11,300 acres, scattered for a distance of 26 miles along the Columbia River from the town of Umatilla to and west of the town of Boardman, the small cultivated areas being surrounded by and contiguous to larger areas of raw undeveloped sagebrush and sand-dune lands. Development on project lands started in 1917.

On account of the fact that there was not a sufficient water supply available water right applications were issued for approximately 7,800 acres of the original irrigable acreage. This acreage was reduced through the findings of the fact finders' committee in 1925 to 7,056 acres, by elimination of water-logged and undesirable lands and later by cancellation of certain water rights to 6,976 acres, on the basis of which acreage under the gross average acre income plan the district is charged by the United States for the yearly construction charge, in accordance with a contract entered into between the United States and the west extension irrigation district, dated April 27, 1926. Previous to 1926 payments were due the United States according to the provisions of the 20-year extension act passed by Congress August 13, 1914.

There are two extremes of soil conditions on the project,—approximately 4,500 acres of very sandy and porous soil on which the water duty is very heavy, and the labor and expense required to irrigate, grow, and rotate crops much greater than on soils requiring less water and less inclined to blow and drift,—2,500 acres of shallow heavier soil, underlaid with scab and natural bedrock formation, admitted by engineers of the Bureau of Reclamation to be impracticable at the present time is largely alkali and nearly nonproductive.

#### 2. IRRIGATED ACREAGE

Of the 6,976 acres in the project with water-right applications, or the irrigable acreage, the following are the actual number of acres irrigated for the years 1926–1929, inclusive:

1926	4,400
1927	4,180
1928	4,000
1929	3,900

Investigation shows that the falling off of irrigated acreage is on lands that have ceased to pay enough returns to pay to farm them, and there is no indication that these abandoned farms will be rehabilitated.

Of the acreage being irrigated, there is no doubt in the minds of this committee but that close to 1,500 acres will become practically unproductive on account of the alkali condition of the soil. The only value possibly would be a poor pasture crop for this 1,500 acres of alkali ground. With proper farming it is the opinion of the committee that 2,500 acres of the total irrigated land may continue in a productive state, providing the morale of the people farming these lands does not become so low on account of the heavy load to bear and the feeling that they are obligated for the entire construction debt and a surely increased operation and maintenance charge as more lands fall out, that abandonment might result, not all at once, but nevertheless lingeringly and surely.

### 3. UNDEVELOPED AND UNIRRIGATED ACREAGE

Of the some 2,900 acres of unimproved and undeveloped lands, this committee believes that under present agricultural conditions, and in competition with, and in comparison with lands of other projects of higher production per acre and with less expense and labor involved in improving and growing crops, and on account of the rough topography of these undeveloped lands, the results to be hoped for would not justify further development of but very small portions, and that over a long period of years. In fact comparing the development of the past three years with the development to be expected in the very near future, it would show no new development.

At this time the district is foreclosing on 1,100 acres of the above-mentioned lands for the 1926 irrigation charges. The principal reason for this is to remove the chance that any of these lands might be sold to prospective settlers at prohibitive prices, so that their futures would be doomed and their efforts in vain to establish a home and provide for their families.

### 4. CROPS

The greatest opportunities in this district lie in the development of the dairy, poultry, and sheep industries, with alfalfa hay and sweet clover or bluegrass pastures as the main crops. Melons, and small fruits are good money makers on a small scale, but the strength of holding the small area now being cropped lies in the furthering and improvement of the above-named industries.

### 5. CROP RETURNS

The average gross acre income on the irrigated lands for the past three years have been as follows:

1926.....	\$29
1927.....	21
1928.....	26
3-year average.....	25

As a comparison, the average acre income in 1928 for all reclamation projects was \$50, as shown by the annual report of the Secretary of the Interior.

The average farm in 1928 consisted of 24 acres with a gross income of \$625, on 168 farms reporting in 1928 on the west division of the Umatilla project.

### 6. CONSTRUCTION CHARGE

Total charge on west extension district.....	\$707, 650. 46
Repaid over 17-year period until 1926.....	61, 402. 58

Repayment of the balance due would be over an estimated period of 70 years.

Since 1926 the yearly charges due the United States have been as follows:

1926 charge (\$2.10 per acre on 6,976 acres).....	\$14, 650. 67
1927 charge (\$2 per acre on 6,976 acres).....	13, 953. 02
1928 <sup>1</sup> charge (\$1.90 per acre on 6,976 acres).....	6, 627. 69

<sup>1</sup> First half 1928 charge due June 30, 1928; last half due Dec. 31, 1929.

Of the above charges due from the district, there has been paid in to the United States \$17,796.81 from a total due of \$35,231.38, or approximately 50 per cent. Interest is due on the unpaid balance at the rate of one-half of 1 per cent per month.

#### 7. DELINQUENT ASSESSMENTS

##### Construction:

1926 assessment as of July 1, 1929.....	\$5, 011. 53
Number of acres delinquent (approximate).....	2, 400
1927 assessment as of July 1, 1929.....	\$7, 465. 63
Number of acres delinquent (approximate).....	3, 700

##### Operation and maintenance:

1926 assessment as of July 1, 1929.....	\$2, 503. 41
Number of acres delinquent (approximate).....	1, 250
1927 assessment as of July 1, 1929.....	\$2, 483. 68
Number of acres delinquent (approximate).....	1, 500

A greater delinquency for the 1928 (current) irrigation assessments is expected, as the collections to date are far below normal.

#### 8. CURRENT ASSESSMENTS

Present construction assessment per acre.....	\$1. 90
Present operation and maintenance per acre.....	1. 65

#### 9. COUNTY TAXES

State and county taxes run from \$1.25 per acre on unimproved lands to \$2.75 on improved lands. Delinquent county taxes on 3,000 acres, \$19,000.

#### 10. MORTGAGES

There are mortgages on 3,500 acres in the district of \$52 per acre, or a total of \$183,235.

Interest and Federal loan amortization payments amount to \$3.50 per acre annually on 3,500 acres or a total of \$12,215.

#### 11. OPERATION AND MAINTENANCE COSTS

The cost of operation and maintenance for the year of 1927 was \$9,400 and for 1928 was \$9,100. The district has been and is on a cash basis, although starting with a reserve fund of \$5,000, at the end of this year this will be reduced to about \$3,000. No provision has been made in the budgets for the continuance or addition to an emergency fund, nor has any replacement fund been provided for, as the directors of the district have been and are unwilling to further burden the present settler, when the crop returns do not justify any additional expense.

#### 12. NECESSARY OPERATION AND MAINTENANCE

A study of the needs of the project in order to exist reveals the following facts:

1. There is a future as to crops for only 2,500 acres of irrigated lands, and a rental or pasture value only for approximately 1,500 acres of irrigated lands.
2. The lands showing the very best crop returns are paying more at the present time in all irrigation charges, along with other liabilities and expenses, than the returns from these lands will justify.
3. There is no hope for any new development in the near future of any undeveloped and nonirrigated lands.
4. It will be impracticable and hazardous to operate a smaller area any more economically, as the same distance of canals, laterals, and pipe lines must be maintained, and no one part of the project could be entirely abandoned.
5. There is necessity for immediately starting an emergency and a replacement fund.
6. The district can not pay all or any part of the present construction yearly charges and at the same time provide adequately for present and future operation and maintenance.
7. Even on the basis of just mere present needs, the district can not ever hope to make repayment of but a small part of the present charges.



A budget to raise a fund large enough to handle an emergency of any magnitude or for the replacement of any great amount of large concrete structures, is inconceivable.

On the basis of these considerations, and conceiving of a small emergency fund for minor unexpected repairs or mishaps, and a replacement fund for the renewal of present wooden pipe lines on the basis of a thirty year deterioration figure, the following yearly budget is recommended:

Normal operations and maintenance cost only	\$9, 000
Emergency fund (sinking fund)	750
Replacement fund (sinking fund)	1, 250
Expected revenues:	
2, 500 acres assessed at \$3 per acre	7, 500
1, 500 acres assessed at \$1.50 per acre	2, 250
660 acres assessed at \$2 per acre <sup>1</sup>	1, 320

The committee does not believe that any lands in the district can pay over \$2.50 per acre as a total for all irrigation assessments without a great deal of sacrifice both of living necessities for the family and of the future for the lands, but an assessment of \$3 per acre on the good lands is about in the same proportion as \$1.50 for the purely pasture lands, and a line must be drawn somewhere to raise the necessary amount of money for operation of the project, or the settler will eventually lose his holdings.

### 13. CONCLUSIONS AND RECOMMENDATIONS

The fact that the United States Reclamation Service (now the Bureau of Reclamation) constructed a dam, canals, and a distribution system to include a project of 11,300 acres, and of this area there was eliminated a total of 4,300 acres; that of the remaining 7,000 acres, certain lands were sure to become alkali, that this condition of shallowness of soil was known to the engineers in charge of construction, that the undeveloped lands in the district are of too rough topography and the development of same would be too expensive to justify the expense as compared with lands on other projects easier to develop and yielding a much greater return when developed; that even though it is known that the United States has expended a large sum of money in construction; these facts cannot but prove to this committee that the settlers are but little to blame for present conditions, and that the largest part of the blame lies with the Reclamation Department in constructing to a project that had a really very small area of good permanent agricultural land.

As the returns from the best producing lands do not give the settler even a reasonably fair living, as production on part of the lands has practically ceased on account of alkali condition of the soil, as no undeveloped land will be brought under cultivation in the near future, as it will require all of the revenue to be derived from all irrigation assessments to operate and maintain the project—for these reasons we, the committee acting on this economic survey, do recommend and request that appropriate steps be taken so that the entire construction cost of the west division of the Umatilla project be cancelled and the mortgage released, and that all water rights appurtenant to the lands on the project and title to the constructed works be transferred to the west extension irrigation district.

We further request that all money heretofore paid to the United States for construction repayments, amounting to some \$79,000 be turned over to the west extension irrigation district, this fund to be used for emergencies and replacements of too large a magnitude to be handled by the small replacement or emergency funds to be raised under regular yearly operation and maintenance assessments.

We further request that, pending any necessary action of Congress to provide for relief for this project, all yearly construction charges due, delinquent, or to become due, by the west extension irrigation district, be suspended, and that the district be given authority to abate all individual construction charges now on the county tax rolls.

<sup>1</sup> Present rental contracts.

## IRRIGATION DISTRICTS

(By H. K. Dean, Superintendent Experiment Station, Hermiston; L. R. Breithaupt, Extension Economist, Oregon State College; G. R. Hyslop, Agronomist, Oregon State College Experiment Station; and Prof. W. L. Powers, Chief of Soils, Oregon State College)

## INTRODUCTION

The Stanfield, Westland, Hermiston, and west extension irrigation districts are surrounded by agricultural conditions which coupled with the economic conditions existing are not conducive to successful farming. This situation must be changed if the greatest use of the land and water available are to be made on the undeveloped areas and if the farmers now on the land are to remain on their farms and maintain a reasonable standard of living.

The soils are generally of rough topography, sandy and of rather low fertility in their natural state, and on account of their low water-holding capacity require frequent irrigations. This makes irrigation difficult and expensive.

The areas are primarily adapted to growing hay crops and pasture. In 1928 on the Stanfield project 62.5 per cent of the cropped area was in alfalfa and 13.7 per cent in pasture. During the same year 51.3 per cent of the Hermiston project grew alfalfa and 30.7 per cent pasture. The average yield of alfalfa per acre was 2.7 tons at Stanfield and 2.4 tons at Hermiston. During the five years 1919 to 1923, inclusive, the alfalfa in the Hermiston district produced an average of 3.6 tons per acre and during 1924 to 1928, 2.5 tons. Figures are not available but similar conditions exist on the west extension. The lower yield now secured is largely due to the extreme age of the stands and their run-down condition, but the feeling of uncertainty on the part of the farmers as to whether they can meet their payments and thus continue to receive water and stay on their farms, has so broken their morale that they do not feel justified in going into these fields, plowing them up, regrading and reseeding so that they can secure better yields in the uncertain future.

The total average crop value per farm for 1928 at Stanfield was reported as \$842, which is believed to be somewhat higher than usual on account of a good fruit crop that year—a crop which is uncertain over a period of years. The total crop value per farm for the past five years at Hermiston was reported as only \$539 annually. The average crop value per farm in 1928 was only \$625 on the west extension area.

An Oregon Experiment Station survey on the cost of producing alfalfa during the years 1925, 1926, and 1927 disclosed that production costs per ton were higher in the area under discussion than in any other irrigated section of the State. The cost based on approximately 1,000 acres on the Stanfield district was \$11.01 per ton in the stack with the average yield 5.13 tons per acre. In the Hermiston and west extension districts, the cost on some 1,600 acres was \$11.70 per ton in the stack, and the yield 5.14 tons. These costs were \$2 to \$3 per ton over the price received by farmers during that period.

Previous and existing contracts between the United States and the irrigation districts have required so much that the farmers have not met these obligations and the fear that the water would be shut off and that they would lose their years of work and their lifetime accumulations has given rise to a feeling of uncertainty which prevents the farmers making improvements in production, such as new seeding of alfalfa, and permanent improvements on their places. This feeling of uncertainty has also resulted in loss of farmers and failure to secure new settlers.

Cooperative effort has been well developed by the farmers now on these projects. All feed materials and seed which the farmers need, and a considerable portion of the fuel and building material used, are purchased cooperatively. Early potatoes, asparagus, eggs, turkeys, wool, and cream are marketed cooperatively. The farm women have even developed a remarkably successful cooperative laundry.

The operation and maintenance and construction or rental costs for water require a high percentage of the crop returns. For 1928 they were 19.3% of the average crop value per acre on the Hermiston district and 16.6% on the Stanfield. These costs are materially raised by the fact that a considerable portion of the lands are not occupied, and a large portion of the unoccupied area is not meeting district assessments. This status is shown in Table 1 which gives the number of farms that are irrigable, irrigated, and the cropped areas.

Since over 15,441 acres out of 36,432 acres in these districts remain uncropped, while much of the land now farmed is inadequately improved and in run-down condition, it is essential that water costs be kept to an absolute minimum.

TABLE I.—*Number of farms irrigated and cropped areas in irrigation districts under consideration in 1928*

	Hermiston irrigation district	Stanfield irrigation district	Westland irrigation district	West extension irrigation district
Acres included in district.....	11, 131	8, 325	10, 000	6, 976
Number farms.....	288	115	50	168
Irrigable area in them.....	8, 476	3, 427	(1)	(1)
Irrigated acreage.....	(1)	(1)	4, 000	3, 780
Cropped acreage.....	7, 124	2, 981	2, 900	(1)
Balance, not cropped.....	4, 007	5, 331	6, 100	(1)
Per cent of total, not cropped.....	35.9	64.0	61.0	-----
Per cent in farms, not cropped.....	15.9	13.0	<sup>2</sup> 27.5	-----

<sup>1</sup> Not available.

<sup>2</sup> Mostly new seeding alfalfa.

#### HERMISTON IRRIGATION DISTRICT

The agricultural status of the Hermiston irrigation district is rather clearly illustrated by information compiled from the crop and livestock reports for the past 10 years and presented in Tables 2, 3 and 4.

#### ECONOMIC TRENDS

The number of farms remained fairly equal until 1925 but have decreased rather rapidly since that date until in 1928 only 288 farms were occupied or 80 per cent of the number in 1922. A considerable portion of the farms reported during recent years are merely irrigated and the alfalfa cut by neighbor tenants and not really occupied or farmed. The cropped area has decreased from 8,530 acres to 7,124 or 16.5 per cent. The total crop value for the project and the crop values per acre show very material reductions. From 1923 to 1928, a 5-year period, the total crop value decreased 48.1 per cent, the crop value per farm decreased 36.9 per cent, and the crop value per acre fell 39.1 per cent.

TABLE II.—*Number of farms, irrigable and cropped area, values of crops, and duty of water, Hermiston irrigation district, 1919-1928*

[Compiled from Crops Census by H. K. Dean]

	1919	1920	1921	1922	1923	1924	1925	1926	1927	1928
Number of farms reported.....	352	349	357	360	350	347	341	310	278	288
Irrigable area in them.....	12, 131	12, 268	13, 441	12, 499	11, 971	11, 630	11, 880	10, 720	8, 794	8, 476
Cropped area reported.....	6, 440	7, 484	8, 271	8, 530	8, 324	8, 402	8, 251	7, 642	7, 116	7, 124
Total crop value.....	\$481, 691	\$376, 927	\$236, 642	\$310, 270	\$270, 403	\$204, 902	\$205, 763	\$173, 248	\$127, 684	\$140, 230
Crop value per farm.....	\$1, 380	\$1, 080	\$663	\$862	\$772	\$590	\$601	\$559	\$459	\$487
Crop value per acre.....	\$75.57	\$50.36	\$28.61	\$36.37	\$32.48	\$24.39	\$24.94	\$22.67	\$17.94	\$19.68
Water delivered (acre-feet).....	-----	-----	4.2	4.4	4.6	4.4	5.6	5.6	5.7	5.9

Total irrigable acres in the district, 1919-1925, 17,300.

Total irrigable acres in the district, 1926-1928, 11,131.

#### CROPPING TRENDS

It will be observed from Table III that the area of alfalfa has decreased from 7,054 acres in 1922, to 3,655 acres in 1928. During the same period the land classed as pasture has increased materially. This is accounted for by the fact that a considerable area of run-down alfalfa is being used as pasture because it is no longer of value as hay land. The total acreage of corn for grain, corn for fodder, barley and grain have increased somewhat during recent years, as has

also the potato acreage but these crops remain relatively unimportant. The fruits and gardens occupy only small areas and are of minor value as compared with other crops.

Eighty-two per cent of the present cropped area is in alfalfa and pasture. The project was constructed under the assumption that the soil and climatic conditions were suitable for fruit, truck and high-priced crops, but severe winter conditions, spring-frost hazzard and low fertility of the soil proved detrimental and practice has demonstrated that agriculture must be of a general nature with crops of comparatively low value per acre. This project must be worked out on a basis of alfalfa and pasture, but the grower of even these crops will have to compete against large areas where hay is generally cheaper than the cost of producing hay in this district. This unfavorable differential in the cost of hay and pasture, together with the necessity for purchasing much of the grain and concentrates, makes it difficult to obtain satisfactory returns from dairying and other livestock enterprises, although it is essential that dairying be practiced extensively if the land is to remain in production permanently.

TABLE NO. III. *Acreage and yield per acre of most important crops, Hermiston irrigation district*

[Compiled from Crop Census, 1919-1928, by H. K. Dean]

Crop	1919	1920	1921	1922	1923	1924	1925	1926	1927	1928
Alfalfa, acres.....	5,324	6,311	6,859	7,084	6,080	6,419	5,850	5,263	4,198	3,655
Tons, average yield.....	3.8	3.7	3.5	3.5	3.4	2.7	2.4	2.5	2.4	2.4
Acreage, per cent of all crops.....	43.9	51.4	51.0	56.7	55.7	55.2	49.3	49.2	59.	51.3
Pasture, acres.....	458	234	397	506	718	1,135	2,036	1,476	1,901	2,187
Value, per acre.....	22.60	32.54	14.26	23.39	17.12	15.63	8.77	10.82	10.95	11.00
Corn, acres.....	49	75	63	78	103	92	69	50	67	167
Bushels, yield.....	31	32.1	33.3	39.9	33.5	13.8	28.9	49.2	28.2	21.2
Corn fodder, acres.....	75	41	45	34	45	25	45	103	32	100
Tons, yield.....	7.5	8.8	7.3	10.9	8.2	6.3	6.8	4.0	6.6	7.1
Barley, acres.....	38	8	34	60	10	3	41	82	61	121
Bushels, yield.....	44	43.7	26.5	29.6	28	33.3	34.6	27.5	22.7	13.8
Wheat, acres.....	18	20	44	61	106	67	43	60	143	174
Bushels, yield.....	13.3	12	10	29.3	29.5	13.2	26.7	25.6	15	10.9
Potatoes, acres.....	24	32	57	74	29	40	54	55	106	163
Bushels, yield.....	56.2	84.6	79.8	104	134	90.2	93	158	115	118
Apples, acres.....	550	617	602	576	491	446	350	336	356	284
Pounds, yield.....	2,440	600	1,721	946	2,790	( <sup>1</sup> )	2,393	1,428	( <sup>1</sup> )	2,240
Fruits, small, acres.....	35	21	30	50	23	10	8	6	9	12
Yield.....	\$97.60	\$99.43	\$89.57	\$82.40	\$203.30	\$44.40	\$103.75	\$198.33	\$41.11	\$106.00
Garden, acres.....	52	90	106	128	84	87	88	117	142	176
Yield.....	\$104.50	\$134.97	\$111.16	\$113.00	\$103.63	\$59.08	\$82.97	\$49.00	\$64.87	\$79.00

<sup>1</sup> Crop failure.

#### LIVESTOCK TRENDS

The number of dairy cattle has decreased somewhat during the past five years, but it is encouraging to note that the number of dairy cattle per farm has increased and the ratio between dairy cattle and alfalfa has improved during the same period. Hay production is now only a little in excess of requirements for feeding the livestock on this project.

The beef cattle kept on the project are of minor importance and as they are in the hands of comparatively few men do not enter into the general situation.

The number of hogs has decreased materially as the farmers have found them unprofitable when kept in excess of the number required to use the waste products of the farms. Chickens and turkeys have increased materially during the past few years. The poultry industries have had a steady growth and are becoming established on a sound basis.

TABLE No. IV. *Total and average farm number Dairy Cattle, Beef Cattle, Hogs, Sheep, Chickens and Turkeys, Hermiston Irrigation District 1919 to 1928*

[Compiled from Livestock Census by H. K. Dean]

	1919	1920	1921	1922	1923	1924	1925	1926	1927	1928
Cattle, dairy, total..	705	722	787	1,416	1,581	2,041	1,876	1,808	1,640	1,713
Cattle, dairy, per farm.....	2.0	2.1	2.2	3.9	4.5	5.9	5.5	6.0	6.5	6.0
Acres, alfalfa, per head.....	7.5	8.7	8.7	5.0	4.2	3.1	3.1	2.9	2.6	2.1
Cattle, beef, total.....	29	44	50	94	119	62	40	47	85	161
Hogs, total.....	819	1,029	1,074	2,300	2,039	811	592	725	654	990
Hogs, per farm.....	2.3	2.9	3.0	6.4	5.8	2.3	1.7	2.3	2.3	3.4
Sheep, total.....		157	274	482	1,046	1,574	3,039	2,812	1,891	1,997
Sheep, per farm.....		.44	.77	1.4	4.7	4.7	8.9	9.1	6.8	6.9
Chickens, total.....	8,395	13,145	13,209	17,132	15,044	13,800	15,807	18,779	22,391	25,452
Chickens, per farm.....	24	38	39	38	43	40	46	61	81	88
Turkeys, total.....								1,987	5,530	9,257
Turkeys, per farm.....								6.4	20	32

## PERTINENT DATA

[Procured from the irrigation district office]

District office books show district owes United States \$1,038,303.29.

The project had paid into reclamation fund \$264,584.60 prior to district assuming obligation.

Since 1926 the district has paid \$33,596.45 to United States. To pay this has taken taxes collected during 1926, 1927, 1928, and 1929.

Delinquency, 1926, none; 1927, \$11,428.29, 5,860 acres. First half, 1928, \$9,647.10, 10,719 acres.

Number of acres: Class 1, 11,043; class 5, 596, temporary, nonagricultural; class 6, 4,767, permanently nonagricultural.

Only 7,124 acres or less than 65 per cent of the class 1 land is being cropped compared to 8,324 acres in 1923 which is evidence that farming is not profitable on a considerable part of the class 1 lands.

Overhead and mortgage, 1919-1926, was \$1.65; 1926-1928 was \$1.90 in spite of acreage eliminated. The location of the land remaining is around the edge of the project so that the entire system must still be operated. Overhead and mortgage is likely to remain permanently high for the same cause.

The local farm bureau committee submits following list of replacements and betterments needed.

Immediate need of replacement:

M. line.....	\$31,000
M. E. line.....	5,000
I. line.....	3,600
Feed canal.....	5,600
	45,200

To be paid by 7,000 acres over next 5 years average of \$1.30 per acre.

Probable any time:

Feed canal.....	\$10,000
K line.....	9,000.
Flanagan.....	2,000

They estimated a 2 per cent replacement fund necessary.

Two thousand five hundred acres are not likely to be improved on account of topography and soil.

Taxes, 1928 (procured from deputy assessor):

Levies—

State and county.....	14.9
Union High.....	7.6
Hermiston School.....	17.2

39.7

Improved land assessed, \$30, \$40, \$50, and class 6, \$4.

Unimproved \$10.

Per acre taxes range \$1.19, \$1.59, \$1.98.

Unimproved per acre, 40 cents; class 6, 15.9 cents; Columbia School levy, 7.6 cents; Minnehaha School levy, 4.1 cents.

The public notice fixed construction cost \$60 and overhead and mortgage \$1, fact finders report gives \$96.17.

In view of (1) the expense of developing and farming soils of this type (2) the low crop value and (3) the high operation and maintenance likely to be necessary because of the small irrigable acreage and probable replacements, we recommend that the district be relieved from all construction costs, in order that the settlers still remaining on the farms may have an opportunity to salvage whatever they may from their investments in this land the improvements they have made on their farms.

#### WEST EXTENSION IRRIGATION DISTRICT

The diversion and distribution works for the west extension of the Umatilla project were originally designed for 11,300 acres. The water supply is entirely return flow from other projects higher up the Umatilla River. The fact finders act reduced the acreage 6,976 acres on account of shortage of water and alkali land. Since that time the water supply has remained practically the same but there has been a serious increase in alkali land. These alkali soils are extremely shallow. They are underlaid with solid basalt at less than 5 feet. Drainage is impractical on account of the heavy-rock work which would be required and the frequency at which the drains would necessarily be placed because they could not be put down to any great depth. The district officials state that the alkali area now covers approximately 500 acres and from present indications will eventually cover 1,500 acres. In addition an estimated area of 2,900 acres is of such rough topography and coarse soil that it has not been developed. In fact it should not be developed for a long time to come on account of the cost to prepare farm land of this type and the low income obtainable.

The district officials believe that eventually there might be 2,500 acres of productive land which could be counted on to pay operation and maintenance assessments. This land lies on laterals along the entire 28 miles of the main canal and is so scattered that the entire distribution system must continue to be operated.

The agriculture of the project is of a general nature with alfalfa and pasture as the basic crops. Melons have been found successful on part of the area but even on these specialized farms alfalfa must be raised and stock kept to build up the fertility of the sandy soils.

The crop value per farm in 1928 was reported as \$625 and the value per acre \$26.

In view of (1) the expense of developing and farming soils of this type, (2) the low crop value, and (3) the high operation and maintenance likely to be necessary because of the small irrigable acreage, we recommend that the district be relieved from all construction costs, in order that the settlers still remaining on the farms may have an opportunity to salvage whatever they may from their investments in this land and the improvements that they have made on their farms.

#### WESTLAND-OUTLINE SURVEY

1. *History.*—(a-b) Investigations and agreements: The settlers petitioned the United States Reclamation Service for an additional water supply in 1917. The McKay dam site was located and work started on it in 1923 at which time the board of engineers allotted water to the district and contract was completed in September of that year, providing for water on a rental basis for ten years, 1925 to 1935, and in April, 1925, another contract providing repayment of the construction charge during the subsequent twenty years.

(c) *Ownership:* With the exception of 300 acres of government land the district is in private ownership. Of the private land, the large holdings include 2,500 acres owned by the Western Land Co. and 1,700 acres by the Northern Pacific Railroad.

(d) *Land prices:* The land company has made little or no effort to dispose of the lands held by it. The railroad lands have been on the market at from \$8 to \$12 per acre on 10 years time at 6 per cent interest. The district directors do not feel that they can conscientiously urge settlement on the repayment basis of the 20-year contract now in force.

(e) *Water and charges:* McKay reservoir water was available to the project first in 1927 under the rental contract at the rate of 70 cents per acre foot plus the district's pro rata of the dam overhead and mortgage, some \$2,400.

(f) Payment record: The district owes the Bureau of Reclamation \$26,276.80 for rental of 1927 and 1928 water.

(g-h) Amendments: A new rental contract between the district and the United States was executed in June 1929, which provided for lowering the rental from 70 cents per acre-foot to 35 cents.

2. *Present economic and agricultural conditions.*—(a) Ownership: The land ownership is the same as under history with the exception of seven tracts on the nonproductive land totaling 450 acres which have been sold since January 1, 1929. Of these seven men five are now on the land, the others intend to start operations this fall. Six of the seven are experienced in irrigation farming.

(b) Irrigable area: 10,000 acres.

(c) Crops: The district is primarily adapted to growing forage crops and pasture with only a minor area in grains.

(d) Productive capacity: The committee believes that this type of land will produce an average of three tons of alfalfa per acre which during recent years has been valued at \$8 to \$9 per ton in the stack. Returns from a well prepared and cared for pasture will likely yield somewhat less money per acre.

(e) Character of cultivation: The sandy nature of the soil requires deep rooted crops such as alfalfa which are capable of drawing moisture from a deep root zone.

3. *Resident farmers.*—(a) Capability: As capable as any similar group of irrigation farmers and have the benefit of the ten or more years of experience.

(d) Buildings: The buildings on the project do not represent a great deal of capital but are substantial. Farm equipment is such as required for general farming.

(c) Credit: Discussed below.

(f) Type of farming: So far as cropping concerned practices are good but additional livestock should be added to the extent of consuming all the forage on the farms.

4. *Size of farm.*—Farms should generally range from 60 to 80 acres.

5. *Land prices.*—Railroad lands are being held at \$8 to \$12 per acre payable in 10 years at 6 per cent.

6. *Demand; cooperation.*—The fact that seven men have purchased land in the project during the year indicated an interest in the land. The Mortgage Co. for America is developing the lands which it holds on the project, believing that it can realize more from them when alfalfa has been established. No local cooperation or capital can be expected for development for raw lands preparatory for settlement.

7. *Capital required.*—(a) Land costs: Land costs \$8 to \$12.

(b) Cost of preparation: The mortgage company finds cost from \$25 to \$33 per acre for clearing and preparation for seeding to which should be added \$10 for irrigation system.

(c) Building costs: Residence building \$600 to \$1,200, temporary dwelling. Barn \$300 to \$500. Other buildings \$100 to \$300. Well, 60 to 100 feet at \$3 per foot \$180 to \$300. Fencing 480 rods per 80 acres. Rabbit wire and three barbs at \$1 per rod, \$480.

(d) Equipment costs.

8. *Credit.*—Practically no mortgage credit is available to irrigated land at the present time. Short-time bank loans at 8 to 10 per cent.

9. *Marketing.*—The marketing problem is a minor one. Alfalfa hay can be sold to dealers and sheep and cattle men. A much better program, however, would be to have dairy cattle or sheep sufficient to use all the hay and these products find ready market.

10. *Transportation.*—Railroads and highways on the project provide the best facilities possible.

11. *Financial obligations.*—(a) Bonded indebtedness: The bonded indebtedness amounts to \$87,500, which the district issued to cover the purchase of the canal system. Retirement of this issue requires an average tax of 75 cents per acre for 5 years and \$1.66 for 10 years.

(b) United States obligations: Contract called for the rental of McKay water at the rate of 70 cents per acre-foot for 10 years, 1925 to 1935, and repayment of the reservoir cost, \$848,500, at the rate of 5 per cent per annum for the subsequent 20 years. The rental costs per acre, based on 10,000 acres during 1927, was 82 cents per acre, and during 1928, \$1.80 per acre. However, only approximately 6,000 acres are paying water charges. The repayment contract calls for payment of \$42,425 a year, or at the rate of \$4.24 per acre.



(c) Overhead and mortgage: The operation and maintenance costs \$1.25 per acre and, in addition, the district estimates 75 cents per acre per year will be required during the next five years for improvements to the canal system.

(d) State, county, and school taxes: Raw land, assessed \$10 per acre, 30 cents. Improved land, assessed \$15 to \$25 per acre, 45 cents to 63 cents. Total taxes with improvements usually about \$1 per acre.

12. *Concessions by creditors.*—Private and corporate creditors have already made such liberal concessions that little more may be expected from them. Further concessions must originate with the United States Bureau of Reclamation.

1. Economic and social benefits: No.

2. Opportunities: Mainly forage production and dairying, farm flocks, and range livestock feeding.

3. Undeveloped land: With the exception of one block of 300 or 400 acres of rather rough land with light soil, it is believed that the entire acreage of the project would be farmed if the water charges are low enough.

4. Delayed settlement: (a) No serious delay has been caused by soil conditions.

(b) There are no serious climatic hindrances.

(c) Project is extremely accessible.

(d) Lack of capital would hinder settler if he did not bring enough with him.

(e) The district board made the statement to the committee that it could not conscientiously urge settlers to go on the land in the face of the water charges as the current contracts require, and that they did not believe the project could be settled under the contemplated construction charge of \$4.24 per acre a year and uncertainty about continued delivery of water.

(f) Local taxes are normal for the conditions.

(g) See (d) above.

(h) Health conditions, insect pests, plant or animal diseases offer no unusual hindrance to settlers.

5. Irrigation payments: The district board says it can not meet the charges under the rental contract and it is doubtful whether it can meet those of the present repayment contract.

The 2,500 acres of land owned by the land company is subject to foreclosure by the district and it is proposed that the district will take over these lands and offer them to actual settlers at low rates and easy terms so that the land will be developed and share in the district assessments.

6. Construction: No construction is asked.

7. Capital: Not less than \$7,500 or the equivalent would be required to develop and bring a 40-acre farm into full production. The settler should have \$5,000 in cash and unless he can obtain credit of \$2,500 it would be necessary to have all of the required capital. Larger units would require proportionately more capital.

8. Credit: Credit is extremely limited at suitable terms and rates for farming operations.

9. Technical aid: The experiment station at Hermiston, an assistant county agent, also at Hermiston, and such assistance as is secured from the home station and extension service of the Oregon Agricultural College at Corvallis is sufficient.

10. State aid: We do not think so.

11. We do not understand that any legislation is required to enable the Bureau of Reclamation to enter into the contract with this district as now proposed by the directors.

The directors of this district have worked out a plan for the payment of construction charges on the McKay Dam on a graduated scale. Total annual assessments for water are estimated at \$3.60 an acre during the first five years, running up to \$5.41 eventually. The directors express confidence in the ability of the district to meet its obligations under this plan, but in the judgment of the committee smaller payments on McKay water would materially facilitate settlement and permanent development of the district lands.

#### STANFIELD OUTLINE SURVEY

1. *History.*—(a) Investigations: Arrangements were first made for the use of water from McKay Reservoir by the board of engineers' meeting of February, 1923.

(b) Agreements: In September, 1923, a contract was entered into providing for the rental of water from McKay at the rate of 70 cents per acre-foot for a 10-year period to be followed by a repayment for construction in 20 years at the rate of 5 per cent a year.

(c) Ownership: Approximately 3,200 acres were owned by the Inland Irrigation Co. and the remaining 5,000 acres by private parties, mostly in small tracts.

(d) Land prices: There has been no settlement of the undeveloped land since the McKay water has been available.

(e) Water and charges: Irrigation with stored water from the McKay Reservoir first began in 1927. This water cost 70 cents per acre-foot and approximately 2.7 acre-feet were used in 1926, making the rental charge \$1.89, mortgage, and \$3 the fl Sde-no'eta rsdlhio shrdl shrd shr to which should be added 53 cents the pro rata of the McKay overhead and mortgage and \$3 the district overhead mortgage, making a total of \$5.42 per acre.

(f) Payment record: The water and dam overhead and mortgage for 1927 was paid and \$3,500 of the 1928 charges and the dam overhead and mortgage have been paid, leaving a balance of \$2,100 due the United States.

(g) Amendments sought: Amendments to the rental contract have been sought on the grounds that the district did not have the money to pay under present conditions.

(h) Amendments secured: The unpaid balance was suspended and the rental contract reduced to 25 cents per acre-foot, both rental and dam overhead and mortgage payable in advance.

2. *The economic and agricultural conditions.*—(a) Ownership: The ownership of the land remains the same, but taxes have not been paid by the Inland Irrigation Co., 3,200 acres, and by several other large holders, which makes around half of the district lands subject to foreclosure for district taxes unpaid.

TABLE V.—*Crop report, Stanfield irrigation district, 1928*

[From report of C. M. Jump]

Crop	Area	Unit of yield	Total yield	Average yield	Total value	Value per acre
	<i>Acres</i>					
Apples.....	161.6	Box.....	25,150		\$20,441.00	\$126.50
Alfalfa.....	1,862.25	Ton.....	5,009	2.71	45,181.00	24.26
Barley.....	30	Bushel.....	280	9.3	238.00	7.93
Corn.....	93.5	do.....	2,125	22	2,337.50	25.00
Cherries.....	5.8				600.00	116.79
Grapes.....	3				240.00	80.00
Garden.....	34.68				3,060.00	88.00
Small fruits.....	2.25				100.00	44.44
Peaches.....	4.25				250.00	60.95
Pears.....	12.25				3,395.00	274.01
Potatoes.....	120.85	Bushel.....	20,379	156	12,227.00	94.17
Pasture.....	409.50				4,433.00	10.83
Wheat.....	176	Bushel.....	2,098	12	2,307.80	13.11
Miscellaneous.....	57				1,059.00	18.64
Fall pasture.....					1,084.00	
Total.....	2,981.21				96,862.70	32.49

(b) Irrigable area: The irrigable area is 8,325 acres.

(c) Crops: In 1928, 62.4 per cent of the cropped area was in alfalfa which gave an average yield of 2.71 tons valued at \$24.26 per acre. Other crops occupying in excess of 100 acres and their values were as follows: Pasture, 409 acres, \$10.83; apples, 162 acres, \$126.50; wheat, 176 acres, \$13.11; potatoes, 130 acres, \$94.17.

The crop report for 1928 is given in Table 5.

(d) Productive capacity and character of cultivation: The committee believes this land with good culture will produce 4 tons of alfalfa. The grain crops give relatively low yields and should only be used between alfalfa preparatory to reseedling. A small area of the portion now cropped is fairly well adapted to fruit, but it is not believed that the fruit area should be extended.

After growing alfalfa and building up with manure, some of the land will be suited for intensive crops, but this would not be for a number of years and can not be counted on during the development period. Most of the land must be devoted to alfalfa and pasture.

3. *Resident farmers.*—(a) Capability and experience: The farmers now on the project have been there for 10 years and upward and are thoroughly capable.

(b) Buildings: The buildings on the project are substantial but do not represent a great deal of unproductive capital. Equipment is not excessive.

(c) Credit: Credit for livestock sufficient to use the crops would be very acceptable if on long time and low interest.

(d) Type of farming: The farming now is of a general type with the basic crop alfalfa, and the project should be developed along the same lines.

4. *Size of farm.*—The farm unit should generally be 40 to 80 acres.

5. *Land prices.*—Lands have been appraised at \$1 to \$15 per acre.

6. *Demand and cooperation.*—Apparently the demand for this land under present winter payment conditions is not great, as no raw land has been settled since McKay water has been available. No cooperation from present owners or local capital may be expected in preparation for occupancy.

7. *Capital.*—(a) Land, \$1 to \$15 per acre.

(b) \$40 to \$50.

(c) Residence, \$600 to \$1,200 for a temporary dwelling; barn, \$300 to \$500; other buildings, \$100 to \$300; well, 60 to 100 feet, at \$3, \$180 to \$300; fencing, 320 rods at \$1, \$320 (40 acres).

8. *Credit.*—Practically no source of mortgage credit is available to irrigated land at the present time. Short-time bank loans at 8 to 10 per cent.

9. *Markets.*—The marketing problem is a minor one. Alfalfa hay can be sold to dealers and to sheep and cattle men. A much better program, however, would be to have dairy cattle or sheep sufficient to use all the hay, and these products find ready market.

10. *Transportation.*—Railways and highways on the project provide the best facilities possible.

11. *Financial obligations.*—(a) Bonded indebtedness of the drainage district within the irrigation district is \$28,500, which the district officials believe could be retired by a tax of 25 cents per acre for 28 years. In addition, the ditch purchase price, \$56,000, is an obligation of the district. This item, however, has been included in the estimated costs of rehabilitation.

(b) United States obligations: The contract with the United States called for rental of McKay water at 70 cents per acre-foot for 10 years and the repayment of the reservoir cost, \$878,000, at the rate of 5 per cent per annum during the subsequent 20 years. The rental cost for 1928 on 8,000 feet at 70 cents was \$5,600 plus \$1,600 dam overhead and mortgage, which amounted to \$2.23 per acre on the 3,000 acres. The McKay water repayment would require \$2.64 per acre from each of the 8,325 acres of the district.

(c) Overhead and mortgage: The per acre cost of the overhead and mortgage is \$3 at present. District officials believe it could be reduced to \$1.75 to \$2 with reconstruction. The overhead and mortgage is likely to remain rather high on account of the character of the canal system.

(d) State and county taxes: Stanfield district improved land is assessed at \$50 to \$75, which with the 1928 levy of 37.8 mills, amounts to \$1.89 to \$2.83 per acre.

12. Private and corporate creditors have already made such liberal concessions that little more may be expected from them. Further concessions must originate with the United States Bureau of Reclamation.

1. Economic and social benefits: No.

2. Opportunities: Mainly forage production and dairying, livestock feeding.

3. Undeveloped land: We believe the entire undeveloped area would be farmed if the water charges were low enough.

4. Delayed settlement: (a) No serious delay has been caused by soil conditions.

(b) There are no serious climatic hindrances.

(c) Project and markets are easily accessible.

(d) Lack of capital would hinder settler if he did not bring enough with him.

(e) We believe the element of uncertainty due to the condition of the present canal and no assurance that the matter will be remedied, coupled with

the high cost and uncertainty of continued delivery of water has prevented settlement. Further delay in determining upon policy to be followed by the Reclamation Bureau is likely to result in loss of many of the farmers now on the project. New settlers are not usually of as good type of farmer as the original settler and are inexperienced.

(f) Local taxes are rather high.

(g) See (d) above.

(h) Health conditions, insect pests, plant and animal diseases offer no unusual hindrances.

5. The district says that it is doubtful whether it can meet the charges under the rental contract and those of the present repayment contract.

6. The committee finds a serious discrepancy between the estimated costs of reconstruction as reported by Harper in 1924 and by Debblor in 1928. We find in the Economic Survey of 1925, page 51, reconstruction and enlargement to be \$200,000, while the Debblor report as quoted in Proceedings of Denver Conference, 1929, page 177, is \$500,000. With such a large discrepancy we are not able to arrive at costs per acre.

7. Capital: Not less than \$7,500 or the equivalent would be required to develop and bring a 40-acre farm into full production. The settler should have \$5,000 in cash, and unless he can obtain credit of \$2,500 it would be necessary to have all the required capital. More capital would be required for larger units.

8. Credit: Credit is extremely limited at suitable terms and rates for farming operations.

9. Technical aid: The experiment station at Hermiston, an assistant county agent also stationed at Hermiston, and such assistance as is secured from the home station and extension service at Corvallis is sufficient.

10. State aid: We do not think so.

The committee feels that under any plan of rehabilitation of this district it will be necessary for the Reclamation Bureau to adopt the most liberal policy of water rental possible.

#### PLAN FOR RECONSTRUCTION AND RESETTLEMENT OF THE WESTLAND IRRIGATION DISTRICT, OREGON

(By P. W. Dent, assistant commissioner; George C. Kreutzer,<sup>1</sup> director of reclamation economies; B. E. Stoutemyer, district counsel; and E. B. Debblor, engineer Bureau of Reclamation)

The Westland Irrigation district includes 16,269 acres. Of this 10,500 acres are regarded as good irrigable land. About 4,500 acres are now being irrigated. The present system can supply water to 8,000 acres. Hence 3,500 acres are supplied with water but are uncultivated and unirrigated. The irrigated land with paid-up flood-water rights is being assessed \$2.60 an acre for water and new land is assessed at \$3.80 an acre.

The district issued \$87,500 in bonds to purchase the system and natural-flow water rights. It also has a contract with the United States for the purchase of 29,250 acre-feet of McKay Reservoir water. The first construction payment is due in 1936. In the meantime stored water is being delivered on a rental basis of 70 cents per acre-foot for a minimum of 10,000 acre-feet in the first year, 12,200 the second year, and continuing at the same rate of increase to the tenth year when 29,250/73,700 of the stored water must be paid for at an estimated cost of \$20,475. Amounts payable by the district are as follows: District warrants, \$2,100; water rental due the United States, \$8,266; bond interest, \$3,950; total, \$14,316. Cash on hand amounts to \$4,488.

The cost of completing the irrigation system is estimated at \$25,000 and improvements to the system are estimated at \$35,000. Some drainage will probably be required later but no estimate was made of this improvement.

Merging the debt for McKay storage water with new construction required and making the total amount repayable in 40 years will not make this undertaking solvent. In other words 4,500 acres of irrigated and cultivated land can not carry the cost of water and upkeep for 10,500 acres. At least 3,000

<sup>1</sup> Died Nov. 23, 1929.

acres more land must be developed and settled before success is reasonably assured. Settlement at present is at a standstill. Bare unimproved land does not appeal to settlers as an opportunity to farm profitably and secure a home in this locality. As a precedent to the expenditure of any more Government funds in this district or of extending the repayment period to 40 years, those in Oregon interested in this district should agree to purchase 60 undeveloped farms and agree to seed 2,400 acres of the land thus acquired to alfalfa and sell these partially developed farms to experienced settlers at cost and on long-time purchase terms. This is regarded as the most essential part of any program to change this district into a settled community of home owners who can pay the cost of water and live comfortably. Any plan that does not provide for this will result in defaults in payment of irrigation charges and requests for deferment of the debts. With this provided for by local agencies in Oregon we would recommend the following being carried out:

(a) United States expend about \$60,000 in completing and remodeling the irrigation system.

(b) Enter into a contract with the district making the cost of McKay water and cost of new work repayable in 40 years.

(c) Bondholders agree to reduce interest on bonds to 4 per cent.

(d) All lands be appraised. Contracts be entered into with the owners of excess lands providing for their sale at the prices fixed by independent appraisal and that incremented value contracts be entered into with the owners of all other lands.

(e) Provision be made in contract to withhold assessments for construction cost on new land for five years if legal obstacles to this course can be overcome.

(f) District operate on an advance payment basis.

(g) That if the necessary appropriation is made by Congress within the next three years, and it is found within the next three years to be otherwise feasible, there should be substituted for subdivision (c) of the above plan a plan similar to the one proposed for the Stanfield district, i. e. (c-1), that title (free from liens and encumbrances) to the canal system now used in the district and to be hereafter improved by the United States, be conveyed to the United States in consideration of a payment of (\$87,500), such payment to be used to retire the \$87,500 of bonds issued for the purchase of the canal by the district; (c-2) In consideration of the payment of bonds and without other payment or consideration, the lands, approximately 3,000 acres, owned or controlled by the bondholders or their trustee and commonly referred to as the 3,000 acres of Western Land & Irrigation Co. lands, be conveyed to the United States or to a trustee to be subdivided and disposed of to actual qualified settlers as directed by the Secretary; (c-3) tax liens for delinquent taxes on the lands so conveyed to the United States or the trustee to be canceled by the district and county in similar manner to that proposed in the Stanfield district.

Since the same interests in Oregon must carry out the farm development at Westland as proposed to develop and settle Stanfield, it is important that these districts do not compete for such financial aid and settlement. Stanfield should go forward first because of the urgency of reconstructing its irrigation system. The loss of any one of three old flumes will cripple Stanfield so that it will be infeasible of operation. In view of this the improvement plans for Westland should be deferred until Stanfield is completed. In the meantime it is recommended—

(a) That the water rental charge for Westland be reduced from 70 to 50 cents per acre-foot for the next three years for such amounts of water as the district may actually require, which sums shall be paid in advance provided the holders of \$87,500 in bonds will reduce their interest to 4 per cent per annum; (b) that the contract of April 22, 1925, will otherwise remain in full force and effect except rate of interest or penalty for nonpayment when due be reduced to 6 per cent; and (c) that when Stanfield district is settled and developed as proposed, that the plan set out above be put into effect, if the conditions at that time warrant and the necessary approval of the plan can then be secured, subject, of course, to the required appropriations being made by Congress.

REPORT ON CONDITIONS OF STANFIELD IRRIGATION DISTRICT,  
OREGON

(By P. W. Dent, assistant commissioner; George C. Kreutzer,<sup>2</sup> director of reclamation economies; B. E. Stoutemyer, district counsel; and E. B. Debier, engineer, Bureau of Reclamation)

## INTRODUCTION

We arrived at Pendleton on June 1 and were joined by Mr. W. G. Ide, of the Oregon State Chamber of Commerce, and Mr. C. C. Gignoux, of the Union Pacific Railroad Co. On the morning of June 2 we met with the land-settlement committee of the Pendleton Chamber of Commerce. We were joined at Stanfield on June 3 by Mr. James McKittrick, engineering appraiser of the Federal Land Bank of Spokane. On June 3 and 4 the irrigation system, farms, and undeveloped land were inspected. Several informal meetings were held with the board of directors of this district.

## OPERATIONS IN 1927 AND 1928

Conditions on the project are much the same as reported last year. They are irrigating 3,000 acres of land. Lands are being assessed \$3.50 per acre for irrigation. Of this, \$3 an acre is operation and maintenance, directly payable to the district. Slightly over 3,000 acres paid this assessment, with a total of over \$9,000, which is considered sufficient for this year's operations. The additional \$2.50 per acre assessment is divided to provide 75 cents per acre to pay the United States for stored water, 75 cents per acre to pay interest on drainage bonds (\$28,500 6 per cent bonds), and \$1 per acre to apply on interest and principal due the Bank of California for the purchase of the irrigation system (\$56,000). Mortgage debts are about the same as last year. The Bank of California has not paid either State or county or irrigation district taxes on its lands. Other nonresident landowners are quite generally delinquent in such taxes. In other words, the 3,000 acres under irrigation are quite largely the sole source of income to the district.

The collections from this area of 3,000 acres will not be sufficient to pay the United States \$5,600 for 8,000 acre-feet of stored water at 70 cents per acre-foot, which is the amount being furnished under their contract this year. The payment which can be made the Bank of California will probably not amount to 6 per cent on the debt owing. Furthermore, the collections from assessments will not be sufficient to pay the interest on drainage bonds.

The district's present indebtedness is as follows:

Drainage bonds.....	\$28,500
Delinquent interest on above bonds.....	855
Contract for purchase of Furnish ditch.....	56,000
Delinquent interest on above ditch purchase contract.....	3,000
Deferred principal owing United States for stored water.....	525,000
<b>Total.....</b>	<b>613,355</b>

## PROBABLE FUTURE OPERATIONS

The morale of settlers, small irrigated area, and increase in seeped lands have prevented the district from collecting sufficient funds to improve the irrigation system. Operations will continue until a major accident occurs. It now appears unlikely that funds will be raised to make needed repairs or replacements at such a time. Should such a contingency be deferred a number of years, the district would after 1929 be ineligible for McKay storage, as the charges for 1928 water will likely be paid in part only.

Discontinuance of canal operation prior to June 1 of any year will result in dry farming operations for that season, and in reversion to practically desert conditions in the following year, excepting as to 1,000 acres located under the Umatilla project feed canal, where, by arrangement with the Hermiston district, a flood-water supply could be obtained, with resulting small-farm income.

<sup>2</sup> Died Nov. 23, 1920.

## GENERAL PLAN OF REHABILITATION

Reestablishment of confidence in local agriculture, now sadly lacking, requires the removal of financial uncertainties in district affairs and a definite plan of future irrigation development. To this end the hereinafter described plan is presented embodying:

(a) Acquisition of irrigation distribution system from private owners, including, without additional cost, some 3,000 acres of undeveloped land.

(b) Reconstruction of canal system to provide efficient and adequate service.

(c) Increase in McKay storage purchase to provide adequate water supply.

(d) Construction of additional drains as needed.

(e) Drainage district bonds to be refunded into long term, low interest-bearing bonds, and to be an obligation of the entire district.

(f) Disposal of raw lands at proper prices to qualified settlers.

(g) Formation of a corporation or group of individuals to underwrite the development into producing farms of about 2,000 acres of the acquired land.

(h) Repayment of costs over a period of 40 years.

## CANAL RECONSTRUCTION

The irrigation system supplying the Stanfield district lands was constructed by the Furnish Ditch Co. in 1905 and operated by that company until June 1, 1927, when operation was taken over by the district. The canal capacity has been maintained at about 110 second-feet, with the irrigated area generally slightly over 3,000 acres. This area can not be safely increased without more canal capacity. Except for a number of flumes with an aggregate length of 5,400 feet (all but one of wooden construction), the system is in good operating condition. With present irrigation methods and practices, canal capacity and the irrigated area are well coordinated. Increase of the irrigated area will result in an estimated decrease in canal losses from 35 to 25 per cent, and the requisite capacity for a district irrigated area of 8,360 acres would be 225 second-feet.

This capacity will require reconstruction throughout. The more important features in this work are the diversion dam, the flumes, and a section along the rock bluffs for a few miles below the railroad crossing. A new dam is required to provide adequate diversion capacity at levels that will force the desired flow through the existing railroad crossing.

The lower two-thirds of the main canal would be enlarged by widening and deepening, with replacement of the bottom lining. The longest flume, 1,100 feet in length, would be replaced with concrete bench flume; the other long flumes, including a 2,400-foot flume, with concrete siphons, and the short flumes would either be eliminated with culverts, or rebuilt more substantially. The cost, including necessary new laterals, is estimated at \$500,000. It should be understood that this estimate is necessarily very rough and should be confirmed by a detailed examination and estimate before being adopted or approved.

The only portion of the work bordering on difficult construction is a section 2,800 feet long, 2 miles below the diversion, where the canal is in a constricted location between the highway and rock hills. It is here proposed to widen toward the hills, and deepen the canal, with little or no raise in water level. At several places, and for an aggregate distance of possibly 1,500 feet, such widening will require removal of rock from faces now 10 to 25 feet high. Over the balance of this section, there is adequate room between the present canal and the rock wall for the enlarged section. The excavated material would be used to widen the outside canal bank. The concrete bank lining would be left undisturbed, so far as possible, and new bottom lining provided.

Construction will not interfere with irrigation operations. All important flumes, excepting the one 1,100 feet in length, can be constructed adjacent the present structures without interfering with their use. The 1,100-foot flume, which would be replaced by a bench flume, would necessarily be wrecked, unless it be found that a tunnel would be preferable to eliminate the flume and a considerable length of open ditch.

The irrigation season in 1927 closed on August 20, and in 1928 will close by August 1 unless additional storage is purchased. The period from Septem-



ber 1 to April 1, which can be used for construction purposes, is sufficient time to permit complete reconstruction in one season of the entire upper portion of the system, including the bench flume, as winters in this region do not stop construction. The lower portion of the canal could best be completed in the second nonirrigation season, with considerable dragline enlargement carried on during the intervening irrigation season.

#### DRAINAGE

A drainage district comprising 1,400 acres of the irrigation district lands has an outstanding bonded indebtedness of \$28,500 at 6 per cent interest, with \$855 in interest and \$13,500 in principal now delinquent. A contract between the two districts provides that these bonds become a general obligation of the irrigation district in the event the United States undertakes reconstruction of the project. It is further planned that the bonds be refunded over a long term of years, with interest at 4 per cent. Fifty-six half yearly amortized payments of 3 per cent each are recommended. The drains constructed with this issue have not been maintained. Recutting thereof, together with additional drains that will be needed to relieve present and prospective seepage, are estimated to cost \$85,000, or about \$10 per acre.

#### STORAGE REQUIREMENTS

Operations in 1927 and 1928, during which McKay storage has been in use, have amply demonstrated the need of an allocation of 3.5 acre-feet of storage capacity per acre to district land, as recommended in the report by Crocker, Hyslop, and Johnson, of July 15, 1925. With the construction of the Birch Creek feeder, McKay storage will cost, roughly, \$2,250,000, or \$30 per acre-foot. Reservoir water for Stanfield will therefore cost \$105 per acre, or \$878,000 for the area of 8,360 acres of irrigable land in the district.

#### PURCHASE OF CANAL SYSTEM

As United States funds may not, under present laws, be expended on private property and the district is financially unable to complete purchase of the canal under its present contract therefore, the plan contemplates purchase of the system by the United States and inclusion of the net cost thereof in the project cost. As neither district nor other taxes are now being paid on its lands, it is believed that for a price of \$56,000 or less the Bank of California may be found willing to convey both the ditch property and its lands. The plans contemplate remission of all taxes on these lands as they are acquired by the United States. There is no question of the ability of the irrigation district to do this as to its taxes and it is believed the county is likewise empowered. Mr. Ide has a written opinion of the State's attorney general to this effect. Returns from sale of land would be credited against the cost of acquiring the ditches and land.

#### Total costs

	Per acre	Total
Purchase of irrigation system.....	\$7	\$56,000
Canal reconstruction.....	60	500,000
McKay storage.....	105	878,000
Drainage.....	10	85,000
Total.....	182	1,519,000
Less credits by sales of land.....	2	19,000
Net.....	180	1,500,000

#### ADDITIONAL EXPENDITURES REQUIRED

Of the total cost of \$182 per acre, \$105 represents purchase of McKay storage, for which the investment has already been largely made. McKay Reservoir has so far cost \$1,900,000, and upon construction of the Birch Creek feed canal at an additional cost of \$300,000, such storage will cost roughly \$30

per acre-foot of capacity. The Birch Creek feed canal will not be required before the Stanfield district is fully developed and the Westland district uses the maximum provided for in its contract for purchase of storage. The needs for more or less immediate work would then be as follows:

Canal purchase.....	\$50,000
Canal reconstruction.....	500,000
Drainage.....	85,000
Total.....	641,000

#### VALUE OF WATER FOR IRRIGATION

Approximately 560 acres of the project consist of "volcanic ash" soil. It is settled in small holdings and is under cultivation. The crops consist of apples, peaches, alfalfa, tame and wild pastures, potatoes, berries, and home gardens. One cutting of alfalfa in the shock, on 32 acres, was estimated at  $2\frac{1}{2}$  tons per acre. In 1927, this area produced a total of 198 tons, or about 6 tons per acre from three cuttings. The stand is 12 years old, but is still quite thick. It is believed that this character of land will average  $4\frac{1}{2}$  to 5 tons of alfalfa per year, one year with another.

The soil of the remaining lands is a very fine sand, fairly fertile and of fair water-holding capacity. These lands require more water than "volcanic ash." Crops inspected showed that 4 tons per acre could be expected on good stands when properly farmed. These lands should average, with a full water supply, about 3 to  $3\frac{1}{2}$  tons of alfalfa per acre over a long time.

The tract should be developed with dairying and poultry raising as major enterprises. Since Portland is only 200 miles away, other crops such as truck and berries are future possibilities. It will require further operations to determine which of these crops should possibly be produced for early markets. Old lands are paying \$5.50 per acre as irrigation charges in 1928, and in 1927 paid \$6 per acre for water. They should have no difficulty in maintaining this rate of payment with more water and with better irrigation and drainage facilities. If the new land is sold at not more than an average of \$10 an acre, and if settlers have sufficient capital to develop farms, or if the land is prepared for irrigation and sown to alfalfa and fenced before purchase, settlers should be able to pay fully \$5 an acre for water after they become established and farm development is completed. For the first four years, the new lands could pay operation and maintenance, but no assessments for construction. The total fixed payments for water on a 40-acre farm would be approximately \$200, and for State and county taxes about \$80, or a total of \$280 per farm.

#### REPAYMENT OF COSTS

The amount that developed lands can pay annually for water under present-day conditions is estimated at \$5 per acre. Operation and maintenance costs are estimated at \$1.75, with interest and retirement of bonded drainage indebtedness estimated at 25 cents per acre, leaving \$3 per acre for construction. New lands are to be exempt from construction charges for four years after water is available. Repayment ability under future conditions is indeterminate, but is bound to increase if agricultural conditions remain as at present.

In view of this situation and the requirements of the law with regard to repayment in 40 years, the following schedule of construction payments is suggested:

Years	Areas paying (acres)	Rate per acre per year	District payment
1 to 4, inclusive.....	3,000	\$3.00	\$36,000.00
5 to 9, inclusive.....	8,360	3.00	125,000.00
10 to 19, inclusive.....	8,360	4.00	334,400.00
20 to 29, inclusive.....	8,360	5.25	438,900.00
30 to 39, inclusive.....	8,360	6.75	565,300.00
Total.....			1,500,000.00

<sup>1</sup> Payments made at end of each year, leaving but 39 years from end of the first year to complete payments

While the lands can no doubt pay the \$3 and \$4 rates for construction, and may even be found capable of paying the \$5.25 rate, payments of \$6.75 per acre for construction, together with \$2 for operation and maintenance applicable after 30 years, are believed very high unless agricultural conditions or dollar values change materially. Any contract with the district for repayment should therefore provide that the Secretary be authorized to defer increases in annual payments.

In the event the Secretary should find that the increases in construction payments provided for in the schedule can not be fully maintained, such unpaid amounts resulting from suspension of increase in annual payments would necessitate a district bond issue to complete payment of the total debt to the United States in the last year.

With the scheduled construction payments, it will take 22 years to return the total of \$641,000 of new moneys required to be invested if the plan is carried through. Should the indicated investment of \$641,000 not be made, the market for McKay storage would be further reduced, as such additional investment not only aids in payment by the district of its present contract obligations of \$525,000 for storage, but in addition provides for disposition of unused McKay storage to the value of \$353,000. In order that the district may have no difficulty in disposing of delinquencies, it is proposed that collections of outstanding delinquent assessments be covered into a reserve fund for the purchase by the district of lands that go to tax sale.

#### SETTLEMENT

Of the 8,360 acres, about 3,740 acres are settled. The remaining lands requiring settlement are owned as follows:

	Acres
Inland Irrigation Co. (Bank of California)-----	3,200
Furnish Investment Co.-----	920
Copeland Estate-----	350
Coe Estate-----	150
Total-----	4,620

No difficulty should be experienced in collecting \$5 an acre for water from the old settled land. These people are quite firmly established and have their places improved and in production. Late water and drainage will further increase farm incomes. The solvency of the district and the return of the Government's investment will depend on what is done to settle the 4,620 acres and bring these lands to the same state of farm development as are the old lands.

The old lands will have to carry a much heavier financial burden than they do at present if the new lands are not completely settled and developed before the district must pay the construction assessments on the large indebtedness for reconstruction. In fact, the construction installments will be confiscatory on the old lands if the new lands are not settled and developed in the first four years after reconstruction is completed. If only 1,000 additional acres are settled and brought under cultivation in the first four years, the construction assessment of \$25,080 would in the fifth to the ninth years become a general liability on 4,000 acres unless owners of the undeveloped land would pay their assessments with money secured from other sources. This would require a payment of \$6.25 an acre for construction on 4,000 acres, which, with a corresponding increase in assessments for operation and maintenance and incidentals, would amount to a total of about \$9 an acre.

The largest assessment heretofore made in this district was one of \$6 an acre in 1926, payable in 1927. This illustration shows that the reconstruction of the system, while desirable and necessary to permit full development of the district, does not insure the solvency of the enterprise. Acquiring the Inland Irrigation Co.'s land and selling it at from \$1 to \$15 an acre will not assure success.

Settlers will require forage the first year to feed dairy stock or sheep to make a living and pay operating expenses. Farms should be leveled, sown to alfalfa, and fenced a year before settlement to assure that forage will be available for a herd of dairy cows. At least 2,000 acres of new land should be planted to alfalfa the first year that a full water supply is available and before the

settlers are invited to purchase the farms. The department has no authority to do this necessary work. It should be done either by a corporation financed and organized for this purpose, or by individuals who desire to see this project succeed. Under either plan they would acquire the land at its appraised value and carry on the development work and sell the partially improved farms to qualified settlers at actual cost. Such farms will appeal to shrewd settlers as an opportunity.

If this work is provided for, settlers should have not less than \$3,000 to \$3,500 to make a first payment on the improved land and sufficient left to buy livestock and equipment and erect a house and necessary farm buildings. This is based on the land costing about \$10 an acre, and with leveling, seeding, and fencing costing about \$40 an acre. Forty acres partially improved would, therefore, cost about \$2,000.

Such land should be sold upon an initial payment of 10 to 20 per cent, and the balance payable in 20 years on the amortized plan, with interest at 6 per cent and subject to the condition that the settler invest the first year at least \$1,000 in erecting buildings and making other necessary improvements. This will leave from \$1,000 to \$1,500 of the settler's capital which can be used for securing farm equipment and necessary livestock to consume the hay. If this plan is not adopted, settlers should have from \$5,000 in capital and equipment to do this necessary development work themselves and be reasonably certain of success.

Business people in Oregon, with whom this was discussed, did not favor a corporation. They were concerned about the difficulty and cost of administration. The funds required would have to come from widely scattered sources and many of them never would be able to see the development or use their judgment in carrying on the development. It was pointed out that with a corporation efficiently managed the work would be uniformly well done. They believed that 40 business men would each agree to buy a unit, clear, ditch and level, and seed it to alfalfa. They would fence the unit and agree to sell it to a qualified settler at cost. Mr. Ide believed he could present this to individuals who would agree to do this.

It makes little difference which plan is followed as long as one-half of the new land is growing alfalfa in advance of settlement. The tentative plan worked out with Mr. Ide for the new lands provides for the following:

(a) That the Government acquire the land when purchasing and acquiring title to the canal system.

(b) That the land be appraised in accordance with its productivity and topography (probably valued at from \$1 to \$15 an acre).

(c) That \$750 be deposited in trust by each individual for the purchase of a unit based on the value of a farm of average size of the best land (50 acres at \$15 an acre, total \$750).

(d) That a contract be made between the United States and the individual providing that the land be cleared, ditched, leveled and seeded to alfalfa and fenced and be sold to qualified settlers on long terms and at cost, with 6 per cent to be allowed on the money invested in the land and its development.

(e) That back taxes be remitted, and that operation and maintenance charges, only, be assessed during the first four years.

Under this plan, \$30,000 would be placed in trust in advance of the United States expending any money for construction and contracts would be secured from responsible parties agreeing to expend an additional amount of about \$1,750 each to carry out the balance of the program. In this way, about \$100,000 would be expended by citizens of Oregon to assure successful settlement and farm development. If it is later decided by those interested in the development that a corporate form of development is more satisfactory, the corporation should have a paid in capital of not less than \$75,000, and \$100,000 would be better.

The program outlined above is an essential part of this development, and the department would not be justified in expending additional funds for reconstruction unless this is assured and provided for.

## EMMETT IRRIGATION DISTRICT, IDAHO

(By W. W. Johnston, associate reclamation economist, and B. E. Stoutemyer, district counsel, Bureau of Reclamation)

## HISTORICAL AND DESCRIPTIVE

The Emmett irrigation district is located in the Payette Valley near the town of Emmett, Idaho. It includes a narrow strip of land on the extreme south side of that valley, known as the "slope" and a more compact area of terraced land on the north side of the valley known as the "bench." The slope is of sandy soil and has excellent air drainage, adapting it to the production of fruit, melons, and other tender crops. The area of the slope is approximately 5,000 acres. The bench includes a smooth body of land with heavier soil. It is better adapted to general farming than the slope and, because of less favorable frost conditions, is only well suited to fruit production in spots. The area of the bench is 18,000 acres.

2. The district is served by canals diverting from the Payette River by means of the Black Canyon diversion dam. The south canal is connected with that dam by a 48-inch wood siphon, which is the controlling structure in the water supply of this canal. Water is pumped to the north canal, which serves the bench area, by direct-connected hydraulic pumps which lift water 23 feet above the surface of the reservoir.

3. The district is a Warren Act contractor with the United States. The project was originally constructed under the Carcy Act. It was organized as an irrigation district and took over the operation of its canal system in 1910. Prior to the construction of the Black Canyon Dam, water was delivered to the present point of diversion through a 15-mile canal which was difficult and expensive to maintain. Operation and maintenance costs prior to the time this dam was constructed varied from \$4 to \$7 per acre per annum. These costs have now been reduced to \$2 per acre.

4. The district appears prosperous to the casual observer, but it is now faced with a debt in the form of bonds and judgments amounting to \$1,665,400, and a Government construction debt of approximately \$813,000 less construction payments made to date. About two-thirds of the landowners are far enough behind in interest assessments that tax deeds may now be issued by the district.

5. The district has asked, first, that the annual construction installments required to be paid to the United States by the district under existing contracts be reduced and the time for completion of payment extended, and, second, that the Government provide for the district additional pumps, or other means of diverting approximately 100 second-feet of additional water into the canals of the district, 50 second-feet additional being requested for the north-side canal, to be pumped into the canal of the district by additional pumps to be provided and installed by the United States, and 50 second-feet additional for the district's south-side canal, to be provided by additional pipe or conduit capacity in the pipe line connecting the Black Canyon Dam with the district's south-side canal.

6. It has long been known that the bond and warrant indebtedness of the district was far in excess of the amount which the district's landowners can pay and that some adjustment between the district and its creditors would be necessary before the district would be able to meet the required payments on its bond and warrant indebtedness. The delivery of water from the dam and pumping plant constructed by the United States being conditional upon the making of the payments required to be made to the United States, the obligation of the district to the United States is in effect a prior lien as the water can not be delivered without such payment, and without water the bonds and other securities of the district would be worthless.

7. Prior to the completion of such an adjustment between the district and its creditors as would put the district on its feet financially, it is considered inadvisable to make any concessions on the payments coming due under existing contracts from the district to the United States, as any such concessions prior to settlement with the bondholders and other creditors would merely have the effect of enabling the bondholders and other creditors to secure a larger

payment on the bond and warrant indebtedness than otherwise would be possible, without any real benefit to the settlers or landowners in the district. For instance, if \$8 per acre per year is considered to be the limit of the amount which the average landowner can pay for operation and maintenance charges plus construction charges due the United States plus interest and principal payments on bonds and other obligations of the district, and if the annual cost of operating and maintaining the district canals amounts to \$2 per acre and the amount required to be paid to the Government as a condition to the right to receive water from the Black Canyon dam and pumping plant is \$2 per acre per year, there would remain a margin of \$2 per acre per year which might be paid on the interest and principal of the bonds, warrants, and other indebtedness and that would be the limit which the bondholders and other creditors could secure on such indebtedness. But if the Government reduced its charge for water from the works constructed by the United States to \$1 an acre per year instead of \$2 per acre per year in advance of a satisfactory settlement between the district and the bondholders and other creditors, this concession on the part of the Government would merely enable the bondholders and other creditors to collect \$3 per acre per year on their claims instead of \$2. For this reason, the concessions recommended in this report should be considered conditional upon completion of a definite settlement between the bondholders and other creditors and the district; or if the settlement with the bondholders and other creditors is in any way conditional, then the conditions should be fully met prior to any reduction in the annual charges provided for in the existing Government contracts.

#### IRRIGATION DISTRICT FINANCES

8. The early financial history of the district is given in the report on the Welser and Fayette River Valleys, Idaho (by James McKittick), made to the Federal land bank in 1920. The following is taken from that report:

"In 1910, after the district was taken over by the settlers, an issue of \$1,100,000 in bonds was voted by the district. Of this issue \$900,000 approximately were sold, part of which was used for retiring bonds sold by the construction company. The last semiannual interest payment, amounting to \$26,328, was made January 1, 1913. The bonds run from 10 to 20 years; the first of these are to be retired in 1922. Indebtedness on warrants issued by the district for construction and maintenance purposes, is at present \$231,000, not including interest. This interest like that on the bonds has not been paid in recent years. In December, 1916, the indebtedness was \$54 per acre. Indebtedness on bonds and warrants at present, including accrued interest, is \$59 to \$60 per acre. This will increase to \$75 per acre by 1922, providing interest remains unpaid until then. It is now planned to then adjust this indebtedness and compromise with the present bondholders, on a 50 to 75 per cent basis. It is said that the bondholders have already offered a compromise.

Assessments have been \$5 to \$6 per acre per year. The money so raised has been used for betterments and operation and maintenance, it being considered more urgent by the district managers to put the canals in substantial condition and provide permanent structures, than to take care of interest payments, and they consequently were allowed to lapse."

9. Following the date of the report from which the above quotation is taken, interest deficiencies continued to accumulate. As will be pointed out in detail later, the district contracted with the United States for the construction of the Black Canyon Dam in 1921. Following the arrangement for this contract, refunding bonds were issued to take care of old bonds and interest delinquencies. The amount of this bond issue was \$1,208,200. During the period of negotiation, additional unpaid interest accumulated and a judgment was taken to cover this deficiency in the amount of \$51,381.40, of which, after partial payment, \$39,755 remains unpaid.

10. There is ample evidence that the money secured from the bond sale was not economically expended. The bonds were sold at a substantial discount and were refunded to include delinquent interest, together with the original bonds at their face value. A large part of the funds originally expended for construction purposes was expended in the construction of works which proved so far faulty and inadequate for the purpose intended that the district was obliged to abandon the same and to turn to the Black Canyon Dam as a substitute means of securing water. This faulty engineering plan, which resulted

in the expenditure of a large proportion of the proceeds of the original bond issue in the construction of works which were later abandoned because inadequate and incapable of permanent maintenance without prohibitive cost, also involved the district in very heavy operation and maintenance charges during the years prior to the time that the Black Canyon Dam was constructed, and the excessive operation and maintenance costs incurred during the years that the district was attempting to keep the canal system in operation in the canyon so exhausted the resources of the district and the landowners that interest charges were necessarily left unpaid, and this accumulation of interest (afterwards refunded), together with the losses resulting from the investment of a large part of the bond proceeds in works which had to be abandoned, is responsible for most of the financial difficulties in which the district is now involved.

11. Prior to the construction of the Black Canyon Dam, Mr. A. J. Wiley, an engineer employed by the district, made an examination and report on the condition of the district canal system. The conditions as found by Mr. Wiley and set out in his report were largely embodied in the preamble to the contract of November 18, 1921, between the United States and the district, and give a very good idea of the reasons which led the district to urge Government construction of the Black Canyon Dam and which induced the Government to undertake that construction for the purpose of preventing the lands of the district from reverting to a desert. The preamble of the contract in question includes the following recitals in regard to the condition of the district irrigation system prior to the construction of the Black Canyon Dam:

"Whereas the district includes about 22,500 acres of irrigable land, most of which is now in a high state of cultivation in orchards, alfalfa, and other growing crops, a large part thereof being now in bearing orchards; and

"Whereas the district owns and operates that certain irrigation system by means of which water is furnished for the lands of the district, the main canal of which system heads at a crib dam on the Payette River about 6 miles below Horseshoe Bend, 22 miles above Emmett, 16 miles above the Black Rock Canyon dam site (sometimes called the Black Canyon dam site), and 17 miles above the head of the irrigation district, and has no other means of furnishing water for said lands; and

"Whereas the said crib dam is largely on a gravel foundation, has been in place about 15 years, was damaged by an extraordinary run of ice during the winter of 1919 and 1920, and is in a precarious condition; and

"Whereas it has been estimated by the engineer of the district that the said main canal, to adequately supply the lands of the district with the present losses, should have a capacity at the head of 500 second-feet, but at the present time probably has a maximum capacity of 250 second-feet, of which 40 per cent is lost by seepage (mostly in the 16 miles of canal above the Black Rock Canyon dam site), and about 150 second-feet is delivered to the lands in the district; and

"Whereas the loss in one section of the said canal above the Black Canyon dam site has been found to be as much as 40 second-feet per mile; and

"Whereas most of the said 16 miles of canal above the Black Rock Canyon is in a difficult and hazardous location in part from the nature of the material and in part from the steep slopes upon which it is located; and

"Whereas at the beginning of the fourth mile of said canal from the head thereof, the canal strikes the steep faces of a mesa which it follows to the middle of the fifth mile, which sidehill is of a very coarse previous gravel and is the section where a loss of 40 second-feet in a single mile was measured; and

"Whereas the material is very treacherous and uncertain, the gravel being compacted enough so that it stands temporarily on a very steep slope and has been excavated as steep as it will stand with resultant caving and raveling into the canal; and

"Whereas at the end of this sidehill the canal enters the section known as the 'big cut,' which is mainly in the same coarse gravel as on the sidehill in the preceding section, but changes near the bottom and at the lower end into gumbo, the big cut being about 2,100 feet long with a maximum depth of cut of about 100 feet with side slopes about one-half to one and subject to constant breaking down of material from these extremely high and steep gravel slopes and the gumbo in the bottom which is kept wet by springs, making it impracticable to work teams, so that the annual cleaning of the extensive



accumulations in the cut is very burdensome, and the partial blocking of the canal by the accumulation of falling gravel backs the canal up on the dangerous side-hill section just above it; and

"Whereas the next one-half mile of canal below the big cut is generally on steep sidehill with caving banks, and about the middle of the sixth mile there is another big cut 50 feet high with steep slopes caving into the canal followed by the pot-hole section near the end of the sixth mile, where a section of the original canal may be seen 20 feet lower in elevation than the present canal and 100 feet to the south; and

"Whereas the ground in this section at times moves downhill, being lubricated by the water in the canal, followed by 900 feet of steep shaley sidehill, followed by 650-foot tunnel in which sand and gravel deposits from the caving banks above, the said tunnel being followed by 2,100 feet of leaky and dangerous ground to the Squaw Creek crossings, followed by a steel flume across Squaw Creek, the metal of which is being cut out by the gravel carried in the canal from the caving banks above; and

"Whereas for the next mile the canal follows down the steep rocky slopes of Squaw Creek and needs to be widened about 4 feet, involving cutting into a solid-rock slope about 40 feet high, which section ends in a 486-foot tunnel below which there is 2,100 feet of rock sidehill with an average cut of 16 to 18 feet upon which the canal should be widened about 5 feet followed by 200 feet of steel flume on a high timber trestle followed by  $1\frac{1}{4}$  miles of bad sidehill location on a steeply sloping solid rock base thinly covered with earth and loose rock upon which it is very difficult to hold the canal, followed by 800 feet of concrete flume, then three-fourths mile of sidehill canal, another steel flume 300 feet long on a timber trestle 600 feet of sidehill canal, another similar concrete flume 800 feet long, 1,400 feet of old steel flume, which is being replaced with concrete flume, followed by 1 mile of fairly good canal requiring enlargement in material about one-half solid rock, followed by about 2 miles of sidehill canal in leaky material extending to a point near the Black Canyon Dam site; and

"Whereas the district has expended during the last five years an average of more than \$100,000 per year in the maintenance and upkeep of the said diversion dam and 16 miles of canal above the said Black Canyon Dam site; and

"Whereas it is the opinion of the engineers of the district that said irrigation works as at present constructed can not reasonably be expected to last and remain capable of carrying water for more than two years longer; and

"Whereas it would cost more to rebuild the said canal and place the same in a safe and permanent condition than to build the proposed Black Canyon Dam; and

"Whereas that portion of the canal system of the district lying below the said Black Canyon Dam site is safe and easy to operate, economical to maintain, and free from excessive seepage losses; and

"Whereas the engineers of the district have strongly recommended the construction of a diversion dam at the said Black Canyon Dam site as a substitute for said 16 miles of main canal; and

"Whereas the district has been unable to sell its bonds for the purpose of constructing the said proposed Black Canyon Dam; and

"Whereas the only chance to secure the construction of said dam with private capital is to issue the district bonds to a contractor in payment for the construction work and to allow the contractor a sufficiently high price payable in bonds to enable him to sell the bonds at a heavy discount and still make a substantial profit on the job; and

"Whereas the district has not been able to secure any definite proposal for the construction of the dam by private contract even on the basis of such increased price to cover the discount on the bonds; and

"Whereas during a period of 20 years the interest on the district bonds would amount to more than the principal; and

"Whereas on account of such interest charges and the increased price of the work to cover the discount on the bonds, and the contractor's profit, it would cost the district at least three times as much to pay for such work under private contract (if private capital could be secured at all) as to pay the United States for the same without interest upon the terms provided in the act of Congress of August 13, 1914 (38 Stat. 686), known as the reclamation extension act; and

"Whereas most of the land to be flooded by the backwater from the said proposed Black Canyon Dam is public land of the United States and has been

withdrawn from entry by the Secretary of the Interior under the first form of withdrawal authorized by the reclamation act of June 17, 1902 (32 Stat. 388); and

"Whereas the Secretary of the Interior has caused plans and surveys to be made for the irrigation of about 58,000 acres of arid land in the Black Canyon division of the Boise project, located in the Black Canyon Irrigation district, a large part of which is public land of the United States, and most of the remainder thereof is land which was public land at the time of the initiation of the Boise project and was entered under the provisions of the said Federal reclamation laws and was settled upon in the expectation of receiving water for irrigation under said acts of Congress; and

"Whereas under the said plans the said proposed Black Canyon Dam is necessary as a means of diverting the waters of the Fayette River for the irrigation of the lands of the said proposed Black Canyon division of the Boise project; and

"Whereas the cost of constructing the irrigation works necessary for the irrigation of said Black Canyon division is such that the said Black Canyon division is considered to be a feasible project if it can be built without charging the same with the entire cost of the Black Canyon Dam, but that the cost thereof is sufficiently high so that the feasibility of said Black Canyon division of the Boise project is considered doubtful, if it were necessary to charge to the said Black Canyon division the entire cost of the Black Canyon Dam; and

"Whereas it is necessary to pump water for about one-third of the land proposed to be irrigated in said Black Canyon district, and whereas the Black Canyon Dam will furnish a convenient and economical power site for generating the electric power necessary for such pumping; and

"Whereas in order to save the Emmett Irrigation district and the entire community from the great loss which would result from the failure of the present canal system and the water supply of the district, and in order to provide a portion of the means for the irrigation of the Black Canyon division of the Boise project, and to provide power for irrigation, the Secretary of the Interior is willing to construct the said proposed Black Canyon Dam and the pumping plant herein provided for, and allow the said Emmett Irrigation district the use and benefit of the same during the irrigation season so far as required for the diversion and pumping of water into the canals of the said district, and allow the district to pay for the same in 20 years' time without interest upon the terms and conditions set out in the said act of Congress of August 13, 1914 (38 Stat. 686), provided the said district will pay the full cost of the said dam and of the pumping plant to be used by the district, upon the terms herein provided and in case said dam is later used as the means of diverting water for the said Black Canyon division of the Boise project, to reduce the charge against the Emmett district on account of the dam to one-half of the cost of the said dam, provided said dam may be used for the diversion of water for said Black Canyon diversion and that the remaining one-half of the cost of the dam is paid by the lands of said Black Canyon Irrigation district, and that the power possibilities of said dam not required for pumping water into the North Side Canal of the said Emmett Irrigation district are reserved to the United States."

12. The importance of the Black Canyon dam to the district and the persistent efforts of the district management to secure Government cooperation in construction of the dam are well known to the landowners and officials who were connected with district affairs at that time, but some statements have been made in this connection by representatives of the bondholders which require correction. Among others, the statement has been made that a draft of proposed contract was printed by the Government in Washington and circulated among the landowners, under which the district was to pay one-third of the cost of the dam instead of one-half thereof. A copy of the printed form referred to has been secured and is found to have been printed in Emmett by the district and circulated by the district, and bears the mark of the printer as "Emmett Index Print, Emmett, Idaho." It may be said in this connection, however, that the contract actually secured by the district was better than a contract to pay one-third of the cost of the dam in cash or interest-bearing securities, as the obligation to pay the Government one-half of the cost of the dam in 20 annual installments without interest amounts to less than an obligation to pay one-fourth of the cost of the dam with interest.

13. Representatives of the bondholders have also made the statement that a power company was willing to build the dam in consideration of securing the power privileges at the dam. Such a rumor was current prior to the time that the contract of November 18, 1921, was made, but upon investigation it was found that the district itself would require the use of a large share of the "firm" power available at the dam site during the low-water season in order to pump water into its north-side canal, the crest of the proposed dam being some 23 feet below the district's north-side canal, and the district's diversion of some 350 or 400 second-feet of the low-water flow of the river above the dam further cut into the low-water flow available for electrical-power development. Upon further investigation the possibilities of private financing were found to be as set out in paragraph 15 of the preamble of the contract, as above quoted.

#### PRESENT BOND ISSUE AND ASSESSMENT REQUIRED FOR REPAYMENT

14. The bonds issued are to mature serially beginning in 1931. The required yearly payments of principal and interest on the bonds, together with the assessments necessary on the basis of 19,500 acres, have been computed by Messrs. Parkhill and McKiltrick as follows:

Year	Average unpaid principal	Bond principal due succeeding Jan. 1	Interest payments	Total payments required	Average cost per acre	Cost per acre for lands assessed at—	
						\$42	\$59.85
1927	\$1,208,200.00		\$72,492.00	\$72,492.00	\$3.70	\$2.90	\$4.14
1928	1,208,200.00		72,492.00	72,492.00	3.70	2.90	4.14
1929	1,208,200.00		72,492.00	72,492.00	3.70	2.90	4.14
1930	1,208,200.00		72,492.00	72,492.00	3.70	2.90	4.14
1931	1,183,200.00	\$50,000.00	70,992.00	120,992.00	6.20	4.87	6.83
1932	1,128,200.00	60,000.00	67,692.00	127,692.00	6.45	5.06	7.21
1933	1,063,200.00	70,000.00	63,792.00	133,792.00	6.85	5.38	7.65
1934	983,200.00	90,000.00	58,992.00	148,992.00	7.65	6.00	8.55
1935	888,200.00	100,000.00	53,292.00	153,292.00	7.85	6.16	8.78
1936	783,200.00	110,000.00	46,992.00	156,992.00	8.05	6.32	9.00
1937	665,700.00	125,000.00	39,942.00	164,942.00	8.45	6.63	9.45
1938	535,700.00	135,000.00	32,142.00	167,142.00	8.57	6.73	9.58
1939	395,700.00	145,000.00	23,742.00	168,742.00	8.65	6.79	9.67
1940	245,700.00	155,000.00	14,742.00	169,742.00	8.70	6.83	9.73
1941	84,100.00	168,200.00	5,046.00	173,246.00	8.90	6.99	9.95

15. In the district apportionment of benefits covering this bond issue, the assessment varies on different lands. Ninety-eight per cent of the lands have benefit assessments or apportionments ranging from \$42 to \$59.85, with an average of \$53.50 per acre. The tabulation above shows that assessments to cover bond principal and interest will vary from \$3.70 in 1930 to \$8.90 in 1941, on the basis of the average benefit apportionment. For lands against which benefits have been apportioned at the maximum of \$59.85, the yearly assessments will run from \$4.14 in 1930 to \$9.95 in 1941.

#### GOVERNMENT CONSTRUCTION DEBT AND ASSESSMENT REQUIRED FOR REPAYMENT

16. The existing contracts between the United States and the Emmett irrigation district (Dated November 18, 1921, and November 16, 1923) require a total construction payment by the district of \$1,200,000 unless the Black Canyon Dam is used for the diversion of water in the Black Canyon district. The said total payment of \$1,200,000 is payable in 20 annual installments, the first four of which are 2 per cent, the next two 4 per cent, and the last fourteen 6 per cent. There is also a small annual payment for the operation and maintenance of the Black Canyon Dam and the direct connected pumping plant. Under this schedule of payments the annual construction payments required to be made by the district are \$24,000 per year for 4 years, \$48,000 per year for 2 years, and \$72,000 per year for 14 years, unless the dam is used for the diversion of water for the Black Canyon district prior to the completion of such payment.

17. From and after the date that the lands of the Black Canyon district or the Payette division of the Boise project actually begin the payment of construction charges on the said dam, it has been agreed in the contracts above referred to that the amount to be paid by the district shall be as follows:

"But it is understood and agreed that should the said Black Canyon Dam be used for the purpose of diverting water for the irrigation of lands in the Black Canyon district, then after the Secretary of the Interior shall have notified the Emmett Irrigation District of the intention of the United States to use said dam for the purpose of diverting water for the irrigation of the lands of the Black Canyon irrigation district, such sum not exceeding \$72,000 as the Secretary of the Interior shall find to be the cost of the following items, to wit:

"(a) Cost of 2 feet extra height of dam.

"(b) Extra right of way and railroad protection on account of extra 2 feet in height of dam.

"(c) A trash rack for power plant.

"(d) Headgates for Black Canyon district canal, in addition to one-half the remainder of the cost of the Black Canyon Dam, exclusive of the cost of the said direct-connected pumping plant and conduit, will be charged to the Black Canyon district as provided in paragraph 59 of said contract of November 18, 1921, and the cost of said pumping plant and conduit and the remainder of the cost of said dam will be charged to the Emmett Irrigation district as provided in said paragraph 59, and from and after the date that the lands of the said Black Canyon district, or the Black Canyon division of the Boise project, actually begin the payment of construction charges on the said dam the Secretary of the Interior will send the Emmett Irrigation district a statement readjusting the charge against the Emmett Irrigation district on the basis above set out, giving the Emmett Irrigation district credit for any excess payment theretofore made by the said Emmett district toward the cost of said dam, which credit shall be applied in an equal amount each year on the remaining installments of the construction cost to be paid by the Emmett district to the United States, and thereafter the Emmett Irrigation district will make payment to the United States in compliance with the charge as set out in said statement of readjusted charges against the said Emmett Irrigation district."

18. As the Black Canyon Dam has never been used for the diversion of water for the irrigation of the lands of the Black Canyon district, the construction payments required from the Emmett district are on the basis of 2 per cent annually of \$1,200,000 at the present time, and will shortly increase to 4 per cent thereof for 2 years, and then to 6 per cent per annum for the remaining 14 years.

19. Recent legislation by Congress, however, will have some bearing upon the total amount required to be paid by the Emmett district. The Interior Department appropriation act for the fiscal year 1930 contains the following provision:

"*Provided*, That all net revenues derived from the operation of the Black Canyon power plant shall be applied to the repayment of the construction cost: First, of the Deadwood Reservoir; second, the Black Canyon power plant and power system; and, third, one-half the cost of the Black Canyon Dam, until the United States shall have been reimbursed for all expenditures made incident thereto. Thereafter all net revenues shall be covered into the reclamation fund unless and until otherwise directed by Congress. No charge shall be made against any irrigation district for the cost of the construction of the said Deadwood Reservoir, the Black Canyon power plant and power system, or more than one-half the cost of the Black Canyon Dam."

20. Since \$1,200,000 is nearly \$400,000 in excess of the cost of the direct-connected pumping plant and conduit plus one-half the cost of the Black Canyon Dam, the effect of this act will be to reduce the total amount to be paid by the Emmett Irrigation district from \$1,200,000 to an amount slightly over \$800,000, thus giving the Emmett district the benefit of the lower charges regardless of whether the Payette division of the Boise project (or Black Canyon district) is built or not. Under this act when the Emmett district has paid the cost of the pumping plant and conduit, both of which were constructed solely for the benefit of the Emmett district, and one-half the cost of the Black Canyon Dam, it will not be required to make further construction payments whether the canal system for the Black Canyon district (or Payette division of the Boise project) has or has not been constructed. Whether this reduction of nearly \$400,000 in the total amount to be collected from the

Emmett district shall be applied in cancellation of the last instalments coming due under the 20-year period of payments or in reduction of all or part of the annual instalments, is not specified in the act but apparently is left to the discretion of the Secretary of the Interior.

21. Unless the existing contracts are modified, it would appear that there would be no change in the annual payments as specified in existing contracts until the cost of the pumping plant and conduit and one half the cost of the dam has been paid, after which no further construction payments would be required from this district. It would be within the discretion of the Secretary, however, to make a supplemental contract with the district providing for a reduction of all or part of the annual instalments provided for under the existing contracts. The construction payments required of this district during the first four years are very low and amount to only about \$1.25 an acre on a basis of 19,000 acres, which places no serious burden upon the water users of the district. Obviously, the 6 per cent instalments, amounting to \$3.75 an acre, would be more serious and, if relief is needed at all, it is needed most upon the 6 per cent instalments which under the existing contracts extend for a period of 14 years.

22. In the printed booklet of the Department of the Interior, entitled "Dams and Control Works Constructed by the Bureau of Reclamation," issued in 1929, on page 19, the cost of the Black Canyon diversion dam, including the pumping plant and siphon or conduit above referred to is stated to be \$1,492,304.80, of which it appears that the pumping plant cost \$106,616.13 and the siphon or conduit \$14,851.93, these last-named items, however, being exclusive of overhead expense which is stated separately as follows:

Camp maintenance.....	\$17,097.92
Engineering and inspection.....	34,374.05
Superintendence and accounts.....	24,243.52
General expense.....	72,959.97

These items of overhead expense appear to amount to a total overhead expense of approximately 10 per cent, being divided as follows:

	Per cent
Camp maintenance.....	1.15
Engineering and inspection.....	2.30
Superintendence and accounts.....	1.62
General expense.....	4.89

Adding the 10 per cent for overhead expense to the items of \$106,616.13 and \$14,851.93, would make the total cost of these two structures, which were built exclusively for the Emmett district and are chargeable exclusively to that district, amount to approximately \$133,614.86 and the cost of the Black Canyon Dam would be the difference between this sum and the said sum of \$1,492,304.80, or \$1,358,689.94, and the one-half of the cost of the dam chargeable to the Emmett district would be \$679,344.97, and the total chargeable to the Emmett district, including the cost of the pumping plant and conduit, would be \$812,959.83.

23. It is possible that we may have slightly misinterpreted some of the items referred to above and these figures should be checked before being used publicly, but we think we are safe in saying that the total construction cost now chargeable against the Emmett district under the existing law will be found to be close to the \$812,959.83 above referred to. A small part of this construction charge has already been paid.

24. Under the figures given above the Government is charging the Emmett district for only half of the cost of the dam and as payment of this amount is permitted in instalments over a long period of years without interest, the Government is in effect charging the Emmett district only the equivalent of one-fourth of the cost of the dam, as payment for one-fourth of the cost of the dam with interest would amount to as much as payment for half of the cost of the dam without interest.

#### JUDGMENTS

25. Certain bond-interest payments and certain warrant indebtedness have been reduced to judgment. The remaining warrants have been outlawed by the 5-year statute of limitations. Judgment and unpaid interest which was due on July 1 of this year totaled approximately \$292,205. This amount is now

due. If repayment of the above amount were collected on the basis of amortizing the \$292,205 with assessments of 8 per cent, the annual payments required for this item of indebtedness would be approximately \$1.20 per acre.

#### SUMMARY OF DISTRICT DEBTS AND ASSESSMENTS FOR REPAYMENT

26. The following summary of irrigation district indebtedness, with the exception of the debt to the United States, has been supplied by Henry Matthews, of the Federal land bank:

Bonds held by—		
Bondholders' committee-----	\$1, 148, 700. 00	
Individuals, mostly landowners-----	59, 500. 00	
		\$1, 208, 200. 00
Interest due July 1, 1929—		
Committee bonds, approximate-----	157, 725. 00	
Individual bonds, approximate-----	7, 200. 00	
		164, 925. 00
Judgments—		
Committee-----	67, 205. 00	
Other, including interest to July 1, 1929, approximate-----	225, 070. 00	
		292, 275. 00
Total interest-bearing debt due July 1, 1929-----		1, 665, 400. 00
United States construction debt-----		812, 959. 83
Total district debt-----		2, 478, 359. 83

27. Assessments required to pay the above indebtedness, according to present contracts, are summarized as follows. These repayments are for minimum rather than maximum requirements.

	Assessments per acre			
	1930	1932	1936	1941
Operation and maintenance-----	\$2. 00	\$2. 00	\$2. 00	\$2. 00
United States construction-----	1. 25	2. 50	3. 75	3. 75
Bond interest and principal-----	3. 70	6. 45	8. 05	8. 90
Judgments and interest, amortized at 8 per cent-----	1. 20	1. 20	1. 20	1. 20
Total-----	8. 15	12. 15	15. 00	15. 85

#### MORTGAGE DEBTS ON IRRIGATION DISTRICT LANDS

28. Messrs. Parkhill and McKittick have estimated the mortgage indebtedness as of October, 1926, as follows:

Character of mortgage	Number	Acres mortgaged	Amount of mortgages	Average debt per acre	Average rate of interest
Federal land bank-----	110	5, 484	\$272, 600. 00	\$49. 70	Per cent 5½
State loans-----	14	1, 075	41, 480. 00	38. 70	6
Private: <sup>1</sup>					
First mortgages-----	81	1, 804	113, 597. 00	63. 00	} 7. 35
Second mortgages <sup>2</sup> -----		1, 645	117, 989. 00	71. 50	
Total of loans tabulated-----	205	8, 363	545, 586. 00	65. 23	6. 32
No mortgages-----		5, 000			
Other mortgages <sup>3</sup> estimated-----		9, 337	466, 850. 00	50. 00	7. 35
Grand total for district-----		22, 700	1, 012, 436. 00	44. 50	6. 75
Average for lands mortgaged-----		17, 700	1, 012, 436. 00	57. 20	

<sup>1</sup> Private loans as recorded for years 1921 to September, 1926.

<sup>2</sup> Second mortgages are on acreage covered by private first mortgages and Federal land bank loans.

<sup>3</sup> Unrecorded and mortgages recorded prior to 1921, no data actually tabulated. Average debt assumed to be \$50 per acre.

29. It will be noted that 5,000 acres are estimated to carry no mortgage debt. The average debt, exclusive of this acreage, is reported to be \$57.20 per acre, with a district average of \$44.50 per acre. The average interest rate is 6.75 per cent. Our investigation has indicated that while there have been some changes in mortgage status of individual farms since 1926, these figures can be taken as substantially correct at the present time. A few mortgages have been paid off or refinanced by foreclosure, but at the same time unpaid interest has accumulated on other farms so that the results for the district as a whole have not been greatly changed.

30. According to officials of the Federal Land Bank, their bank has made 132 loans on farms which include 6,515 acres of Emmett district lands. These loans totaled \$350,450. This represents \$315,930 loaned on district lands, with an average per acre loan of \$49. Of these loans, three totaling \$8,000 have been charged off. Twenty-nine loans, representing \$100,200, have been foreclosed and of these thirteen have been resold. Four additional are under foreclosure proceedings. Lands reported in the loans have the following approximate delinquencies:

Delinquent payments to Federal land bank.....	\$906.75
General tax delinquent to 1927, approximately.....	12,218.00
District tax delinquent to 1927, approximately.....	36,116.00

The delinquency tax for 1928 has not been computed, but the Federal land bank estimates that delinquencies to date for general taxes would total \$18,000 and for district taxes \$70,000.

#### TAXES

31. General taxes on lands under the Emmett district are comparatively high. Levies on \$100 valuations run as follows:

	Average	Maximum
State and county.....	\$2.64	\$2.64
School districts (60 cents to \$2.20).....	1.30	2.20
Road district.....	.25	.25
Total.....	4.19	5.09

32. The taxing valuations for irrigable lands vary from \$45 to \$65 per acre, depending on distance to town, quality of land, and adaptation: that is, whether it is fruit land or general farming land. The average valuation of general farming land on the Emmett bench is \$55 per acre, while the valuation for the best fruit land a short distance from town is \$65 per acre. These valuations make the per acre tax vary from \$2.30 as an average to \$3.30 as a maximum.

#### DRAINAGE DISTRICT ASSESSMENTS

33. Drainage district No. 1 of Gem County includes approximately 1,584 acres of lands in the Emmett district which are assessed for contributing damages. According to the secretary of this drainage district, the total drainage assessment against the Emmett district lands is at the rate of \$6.26 per acre against the 1,584 acres above referred to. The yearly drainage assessments on this area at the present time are 56 cents per acre and this is expected to decrease to from 10 to 12 cents per acre beginning about 1948. These lands are all under the south side canal of the district.

#### SUMMARY OF FIXED EXPENSES UNDER PRESENT CONTRACTS

34. Under present contracts, farmers in the Emmett district will be confronted with fixed expenses, as follows:



	1930	1932	1936	1941
<b>Irrigation assessments:</b>				
Operation and maintenance.....	\$2.00	\$2.00	\$2.00	\$2.00
United States construction.....	1.25	2.50	3.75	3.75
Bond interest and principal.....	3.70	6.45	8.05	8.90
Judgments and interest, amortized at 8 per cent.....	1.20	1.20	1.20	1.20
Subtotal.....	8.15	12.15	15.00	15.85
Mortgage repayment (basis Federal farm loan).....	3.73	3.73	3.73	3.73
Taxes.....	2.30	2.30	2.30	2.30
<b>Total.....</b>	<b>14.18</b>	<b>18.18</b>	<b>21.03</b>	<b>21.88</b>

35. The above calculations are for the portion of the district which is mortgaged. The fixed expenses on lands free of mortgage debt would be decreased by \$3.73 per acre. Lands included in the Gem County drainage district No. 1 would have to meet fixed expenses of 56 cents per acre more, and farms subject to the maximum taxation would have an added expense of \$1 per acre to meet. The fact that payment of mortgage indebtedness is calculated on the Federal land bank basis (which is the most liberal offered by any loan institution), together with the fact that no allowance is made for additional assessments to care for delinquent lands, shows that the figures given represent minimum rather than maximum requirements. These costs are from 50 to 100 per cent more than the rental value of the land and are considerably in excess of what the lands of the district can repay.

36. In most cases mortgage loans were in larger amounts than was justified in view of the heavy bond and warrant indebtedness of the district. Many of the mortgage loans were made at times when war prices prevailed, and it is believed that the practical effect of such loans in many cases was equivalent to a sale of the property to the mortgage company or Federal loan bank, the loan being more than the margin of value to the property owner above the amount required for water payments and bonded indebtedness. For practical purposes, the mortgage companies must be considered the real owners of most of the mortgaged property unless some adjustment is made in district obligations.

#### READJUSTMENT OF DISTRICT FINANCES

37. It has long been known that some adjustment between the district and its creditors would be necessary before its bond and warrant indebtedness could be paid. Negotiations between interested parties leading to such settlement have been taking place during the past year, and agreements have now been secured from the bondholders to accept 50 per cent on the face value of the bonds; and all but one of the judgment and interest creditors have agreed to accept a 35 per cent cash payment for full settlement of the judgment and interest indebtedness. This agreement with the bondholders terminated on July 1, but has been informally extended to October 1, 1929. The agreement with the judgment holders also terminates on October 1, 1929.

38. The following memoranda show the basis on which such adjustment is proposed to be made and the agreements secured:

#### EMMETT IRRIGATION DISTRICT—MEMORANDUM ON NEGOTIATIONS FOR SETTLEMENT OF FINANCIAL DIFFICULTIES

1. During the past 12 months many conferences have been held between (a) officers and landowners in the district, (b) representatives of the Federal Land Bank of Spokane, (c) judgment creditors of the district, (d) members of the bondholders' protective committee and their representatives, and (e) officers of the State of Idaho and members of the State board of land commissioners.

2. As a result of the investigations made and the many conferences and negotiations had, the following basis of settlement shall be submitted to the various groups of interested parties as enumerated above, for the purpose of ascertaining if a settlement can be concluded on that basis:

(a) The holders of refunding bonds, or the committee representing such bondholders, shall be paid 50 per cent of the par value of the bonds held or

controlled by them, respectively, and 35 per cent of all accrued and unpaid interest, judgments, and accrued interest thereon due the bondholders or said committee at the time the settlement is made, in full satisfaction of their claims against the district.

(b) Judgment creditors shall be paid 35 per cent of the amount of their respective judgments and of the accrued interest thereon to the date settlement is made in full satisfaction of their claims against the district.

(c) The officers of the district and/or landowners in the district shall take up the negotiations for settlement with the judgment creditors and with holders of nondeposited bonds. Mr. Henry Matthew, who has participated in the negotiations as the representative of the Federal land bank, shall present the matter to the proper officials of that institution, and Messrs. Richards & Haga shall present the matter to the bondholders' protective committee.

(d) The basis of settlement as stated above is understood to be wholly tentative and shall not be binding upon any of the interested groups or parties enumerated above until approved in due form by the creditors or parties or their proper representatives thereunto duly authorized.

(d) The proposed settlement is on the basis that the amount due the creditors shall be paid to them in cash not later than July 1, 1929. Upon payment being made, the bonds, coupons, judgments, or claims of the creditors included in the settlement shall be transferred, assigned, and delivered to the duly authorized representative or representatives of the landowners.

Dated at Boise, Idaho, April 2, 1929.

RICHARDS & HAGA,  
*Attorneys for Bondholders' Protective Committee.*

HENRY MATTHEW,  
*Representative of Federal Land Bank.*

ANDREW LITTLE,  
*Landowner in District.*

CRAWFORD MOORE,  
*Representative of Judgment Creditor.*

I. H. NASH,  
*Land Commissioner of State of Idaho.*

BOISE, IDAHO, May 7, 1929.

MESSRS. ANDREW LITTLE, HENRY MATTHEW, AND OTHERS:

GENTLEMEN: On April 2, 1929, you, on behalf of yourselves and others, and our firm, on behalf of the bondholders' protective committee, signed a memorandum outlining a basis of settlement of the indebtedness of the Emmett Irrigation district represented by bonds of and judgments against said district. The suggested plan of settlement was tentative and was subject to the approval of the groups which we respectively represented.

You are now advised that the proposed basis of settlement as outlined in said memorandum will be accepted by the bondholders' protective committee upon the following conditions and with the following modifications:

(a) All land in the Emmett Irrigation district to which Gem County and the Emmett Irrigation district have taken tax title or to which either the county or the district may now take title under delinquent taxes, shall be conveyed by the county and the district, respectively, for the least consideration which either are authorized by law to convey such land, and in no event for more than the delinquent tax under which title was taken. The lands shall be conveyed by the county free and clear of subsequent taxes levied by the county and by the district free and clear of taxes subsequently levied by the district. The land shall be conveyed to a trustee satisfactory to our firm, as trustee for the bondholders and the parties represented by yourselves in these negotiations.

(b) The bondholders shall have the right to select out of such lands not to exceed 2,000 acres and receive title thereto from such trustee upon payment of the amount paid by the trustee to the district or the county at the sale referred to in the preceding paragraph. Upon selecting said land and taking a conveyance thereto, the bondholders shall be entitled to use their bonds at 50 per cent of their par value and all coupons and accrued interest at 35 per cent of the par value thereof, in paying or discharging the pro rata indebtedness against said land evidenced by bonds and judgments on a pro rating basis of 18,000 acres. The bondholders taking such land and using their bonds and coupons in paying such indebtedness shall bear the same relation to the com-

mittee handling the settlement and to the district as other landowners who pay their pro rata share of such indebtedness in cash.

(c) The right of the bondholders to elect to take land on the basis aforesaid, instead of cash for their bonds, shall be exercised within 30 days after we are advised:

(1) That all the judgment creditors have agreed to accept 35 per cent of the face value of their respective judgments in payment therefor;

(2) That cash has been provided and is available for payment to the bondholders who elect to take cash in lieu of land on the basis of 50 per cent of the par value of the bonds and 35 per cent of all accrued and unpaid interest, whether evidenced by judgment or interest coupons.

(d) All land taken over by the trustee and not taken by bondholders represented by the committee may be sold under the direction of your committee and the proceeds thereof, after paying all expenses incurred in connection with this settlement, shall be pro rated to the landowners according to the acreage owned by each or paid into the maintenance fund of the district, or otherwise applied for the benefit of all landowners in the district.

We desire to be as helpful as we can in bringing about a settlement that will promote a more prosperous condition in the Emmett district and the bondholders who take land in lieu of cash will simply reduce the burden on your committee by providing such a large amount in cash. We have no definite assurance as to the amount of land that will be taken by the bondholders, but to better meet the arguments of bondholders that this settlement is too favorable to the landowners, we must be prepared to give to such bondholders the option of becoming landowners in the district at a nominal outlay for the land.

Respectfully,

RICHARDS & HAGA.  
*Attorneys for Bondholders' Protective Committee.*

#### Memorandum re settlement Emmett Irrigation district.

The following matters must be worked out in order to complete the settlement with the bondholders and judgment creditors of the Emmett irrigation district.

1. Andrew Little, the Federal Land Bank, Crawford Moore, and their associates must provide the cash required to complete the settlement, if all creditors demand cash, to wit, approximately \$764,000.

2. The cash raised for completing the settlement should be repaid by the landowners pro rata to the above mentioned parties as quickly as possible, and the details for bringing that about must be handled by some organization acting under the direction of an advisory committee composed of those who are taking the lead in bringing about the settlement.

3. To protect the parties who are advancing the funds required to complete the settlement, the amount advanced by such parties and all costs of completing the settlement and working out the details should be pro rated over an acreage embracing only lands that are amply able to bear their pro rata share of such costs and advances, say, 18,000 or 19,000 acres, as it will be impossible to get those who first make settlements to make additional contributions to take up any deficit.

4. To protect the committee advancing the money and expenses, the bonds and judgments taken over should be transferred to a trustee for the committee. There should also be transferred to such trustee all lands held by Gem County and the Emmett irrigation district, and perhaps those held by the State of Idaho, unless the latter pays its share in cash. Those lands should be transferred at the minimum cost per acre at which they may be legally sold or transferred.

5. Bondholders desiring to take land in lieu of cash for their bonds should have the right to select such lands as they may desire out of the tract so held by the trustee for the committee, using their bonds and coupons to pay up the water rights and charges against the land and thereby reducing the cash required to be advanced by the committee to the bondholders.

6. An organization should be effected for the purpose of working out all details and getting valid agreements with judgment creditors and holders of free bonds, landowners, and others affected by the settlement and whose consent is required. Such organization must also bring about the settlements with the county and district for the transfer of lands now held by them.

# 138 ECONOMIC SURVEY OF CERTAIN IRRIGATION PROJECTS

7. The lands taken over by the committee and not used in effecting settlements with bondholders should be resold at the best price obtainable with a fully paid water right so far as bonds and judgments are concerned, and the net proceeds from such sales, after paying all expenses of the committee and the organizations used to bring about the settlement, should either be pro rated with the landowners in proportion to the acreage owned by each respectively or should be paid into the district maintenance fund.

## List of judgments against Emmett irrigation district

[Taken from data believed to be reliable, but not checked with official records except in two or three cases]

Judgment creditor	Date of judgment	Amount of judgment	Amount due Oct. 1, 1929
Bank of Emmett (Crawford Moore).....	June 1, 1926	\$46,612.34	\$58,488.54
Crawford Moore, trustee.....	Mar. 9, 1926	12,584.60	15,719.40
F. M. Joslin (Reddock & Hunter).....	Dec. 10, 1925	27,870.40	35,094.77
Ella M. Brown (Hawley & Hawley).....	July 31, 1925	25,061.07	32,370.54
First National Bank of Emmett.....	Dec. 31, 1924	22,203.35	29,585.96
J. P. Reed, of Emmett.....	Apr. 1, 1926	22,842.21	28,438.55
Ed L. Anderson, 530 North Ardmore, Los Angeles, Calif.....	June 1, 1926	1,515.85	1,869.54
Boise Association of Credit Men.....	Nov. 23, 1926	5,298.56	6,356.66
Elizabeth Hawkins, of Emmett.....	Nov. 27, 1926	3,008.84	3,607.34
Ella C. Reed, Statehouse, Boise.....	Mar. 7, 1928	1,843.85	2,046.05
Bondholders' protective committee (Richards & Haga) balance.....			67,115.93
Total.....		168,841.07	280,693.28

The judgment held by the bondholders protective committee represents a balance due under a settlement made May 1, 1925, when the refunding bonds were delivered and credited on existing judgments. The balance of the judgment is \$39,524.93 and it bears interest from October 11, 1919.

Agreement: The undersigned, being judgment creditors of the Emmett Irrigation district, Gem County, Idaho, and desiring to cooperate with landowners in and creditors of said Emmett irrigation district in refinancing said district in consideration of \$1 and other valuable considerations to them each in hand paid by Andrew Little, representing himself and other landowners in said district, and Henry Matthew, representing the Federal Land Bank of Spokane, Wash., the receipt whereof is hereby acknowledged by each of the undersigned, respectively, hereby agree, each for himself, or itself but not one for the other, to transfer and assign their respective judgments against said irrigation district to any trustee designated by said Andrew Little and Henry Matthew, or the survivor in the event of the death of either, upon payment of 35 per cent of the amount of their respective judgments, including 35 per cent of the accrued interest thereon to the date of such payment.

This agreement may be enforced by the said trustee, but if the said payment be not made or tendered before October 1, 1929, the undersigned shall be released of all obligations hereunder.

May 8, 1929. Bank of Emmett, by Crawford Moore, president.

May 8, 1929. Bondholders Protective Committee, by Richards & Haga, their attorneys.

May 8, 1929. Crawford Moore, trustee.

May 11, 1929. Ella M. Brown, by Hawley & Hawley.

May 13, 1929. F. M. Joslin, by Chas. F. Reddock & C. S. Winter, his attorneys.

June 12, 1929. First National Bank, by C. B. Knox.

June 14, 1929. Ed L. Anderson, by Dean Driscoll, his attorney.

June 19, 1929. Boise Association of Credit Men, by J. P. Pope, attorney.

July 8, 1929. International Harvester Co. of America, by W. A. Bass, traveling collector.

## OPTION TO PURCHASE JUDGMENT

Know all men by these presents:

That for and in consideration of the sum of \$1 this day paid to me by Andrew Little, of Emmett, Idaho, the receipt of which is hereby acknowledged, I do hereby grant and convey unto him an exclusive option to purchase from me all my right, title, and interest in or to that certain judgment rendered and filed

and entered in the District Court of the Seventh Judicial District of the State of Idaho, in and for the county of Gem, on or about the 1st day of April, 1926, in that certain action in said court entitled J. P. Reed, plaintiff, v. Emmett Irrigation District, a quasi-municipal corporation, defendant, which said judgment appears of record in Book B of judgment records, at page 161 thereof, in said district court, said judgment being for the sum of \$22,841.21 together with interest thereon at the rate of 7 per cent per annum from the 1st day of April, 1926. The option to purchase said judgment hereby granted shall remain in force and effect for a period of 90 days from the date hereof; and, in the event that said option shall be exercised, I hereby agree to accept as the full purchase price for said judgment 50 per cent of the amount that shall be due on said judgment, principal and interest, at the date payment shall be made therefor, and further agree to make a proper written assignment thereof to said Andrew Little or to any other assignee that he may designate.

Dated this 9th day of July, 1929.

J. P. REED.

*Emmett irrigation district bonds (refunding issue)*

DEPOSITED BONDS

Held by bondholders' committee, New York----- \$1, 148, 700

FREE BONDS

(Held by landholders)

A. P. Peterson-----	\$600
J. Lee Reed-----	700
N. B. Barnes-----	3, 100
Andrew Little-----	24, 800
A. L. Sheep & Land Co.-----	400
Fred C. Schadt-----	5, 100
Hannah M. Reed-----	2, 600
W. C. Stone-----	700
W. W. Hoops-----	1, 300
J. L. Jensen-----	1, 500
P. M. Spratt-----	5, 500
C. H. Coplin-----	500

46, 800

FREE BONDS

(Held by nonlandholders)

T. B. Hargus, Anaheim, Calif-----	\$600
Minnie E. Fulton, Wilmette, Ill-----	1, 000
First State Bank, Bronson, Mich-----	3, 500

Total of refunding bonds issued-----	1, 208, 300
Bonds not exchanged-----	4, 000

Total of issue-----	1, 208, 200
---------------------	-------------

REASONS FOR TERMS AGREED UPON

39. It will be noted that one judgment holder, Mr. J. P. Reed, has signed an agreement to accept 50 per cent instead of 35 per cent in settlement of his claim. This man is a lawyer who lives in Emmett and should be more interested in making concessions than the other creditors. The reasons for his taking this stand are said to be that he considers his claim should be settled on the same basis as the bonded debt. On the face of things it might appear that this is correct and that all debts should be settled for 35 cents on the dollar. Reasons given for this differential are that 50 per cent represents the lowest terms that bondholders can be induced to accept, at least without years of further delay with resulting loss to the district in the way of loss in settlers and weakened morale of those who remain. It is claimed by the bondholders' committee that bills they owe to their attorneys, and other unpaid expenses incurred in connection with district matters, are sufficiently high to take up the 15 per cent difference. Also, they appear confident that at least this

amount can be collected by means other than the arrangement now proposed. Their confidence is caused in part by the fact that in all lawsuits between themselves and the district, they have been successful, and some interest has been paid them each year.

40. It is our opinion that the present arrangement is a desirable one for the landowners to accept. Even if more favorable terms could be secured by further negotiations, it will be better for the landowners to deal now while the project is still well settled and while the Federal Land Bank and other interested parties are favorably inclined toward giving financial assistance in the refinancing program than to hold out for more favorable terms.

#### SOURCE OF FUNDS FOR REFINANCING

41. As is brought out in the foregoing, negotiations with district creditors call for a cash settlement. A fund of approximately \$764,120 will be required. It is planned to divide this on the basis of 18,000 acres and to refund a pro rata share of added amounts collected by reason of additional acreage. On this basis approximately \$43 per acre will be required. It is proposed that each piece of land will stand its pro rata share of the debt and, after payment in full, will be relieved of joint liability responsibility for the remainder of the district (bond and judgment) indebtedness.

42. As has been indicated, an area of about 5,000 acres is free of mortgage debt. The necessary funds for this land could be readily raised, probably by loans from the Federal land bank. It is expected that loan companies will advance funds necessary for all lands on which they have loans where there is sufficient equity to protect. The Federal land bank has loans on some 6,500 acres which they plan to finance. The State of Idaho has made a contingent appropriation of \$50,000 to be used in paying bond and judgment debt against some 1,000 acres of State land; \$46,800 worth of bonds are held by landowners, which will cancel the bonded debt against some 780 acres.

43. It is proposed that any land for which the necessary funds can not be raised will have to continue under the present plan of repayment and that title will finally pass for delinquent payments. This land would represent farms in which the owner's equity is practically nothing and on which title would be eventually lost regardless of progress in refinancing the district. It is estimated that title would be lost on from 10 to 20 per cent of the district lands. Since mortgage debts would be liquidated in tax-title proceedings, it is to be expected that such lands could be resold on low enough terms that the purchaser could finance his pro rata share of the bond and interest debts of the district. There is some disagreement as to who should handle this part of the program. District officials have stated that the creditors would need to bid in delinquent land, in accordance with their privilege under the Irrigation district law, but Mr. Haga, the attorney for the bondholders' committee, considers that creditors should be paid in full and the matter of resale of bankrupt farms be handled by the district or agencies that are financing the readjustment.

#### LANDS NOW DELINQUENT IN IRRIGATION TAX

44. Time was not available to determine accurately the acreage of land delinquent in taxes to the district. It was possible, however, to make an estimate from figures available in the office of Mr. Haga (who represents the bondholders), from district records, and from information secured from individual farmers. On this basis it is estimated that at least two-thirds of the area is delinquent in bond-interest assessments to an extent that tax title could now be taken by the Irrigation district.

45. The district has not followed the practice of forcing collection of bond interest. During the past four years operation and maintenance charges have been on a toll basis, delivery of irrigation water being contingent on the payment of the operation and maintenance charges. During the past year payment of funds for Government construction has also been required before water delivery. The latter assessments have not been made for a long enough period for tax title to pass on account of delinquencies.

46. The agreement of the bondholders to accept 50 cents on the dollar in payment for the bonded debt is made on condition that both the district and county will secure tax title to all lands subject to tax deed for their respective taxes, and will convey such land (free of subsequent district or county tax) to a

trustee at the lowest sale price permitted by law. Bondholders who are dissatisfied with the terms of repayment will be permitted to take not to exceed 2,000 acres of this land instead of cash payment, and will be allowed to use their bonds and bond coupons in repaying the pro rata share of such debt on their lands. It is proposed that the remaining land will be sold by the trustee to purchasers who can finance the readjustment and that funds from such sale will be used, first, to pay the expenses incident to the financial readjustment; and, second, to increase the maintenance fund of the district or to be refunded to the original landowners in proportion to their acreage. This agreement would have the effect of forcing all landowners who wish to retain title to their farms to pay up all but two years of their delinquent district taxes. It would appear that such payment would have to be made on a 100 per cent basis, but Mr. Haga has stated that it would be agreeable to the bondholders that an arrangement be made for repayment of these delinquencies on a basis of 35 cents on the dollar.

47. The agreement states that lands will be conveyed to the trustee free of all subsequent district taxes. A literal interpretation of this statement would require that the district, before conveying such lands, pay up all delinquent interest assessments to the date of such transfer. According to Mr. Haga's interpretation of this, however, delinquent interest assessments would not be considered but the district would convey title free of any delinquent operation and maintenance or Government construction charges.

48. This agreement does not provide for any notice or any plan for the redemption of title by landowners. It is believed that the landowner should either be given a 90 days' notice before tax deed is issued, or should be allowed to redeem within 90 days after such tax title is taken by paying all delinquencies and costs. Some such provision would seem to be necessary in order to protect the interest of the present landowner. The bondholders and the district are partly to blame for present interest delinquencies, because no steps have been taken to force the payment through the means provided by the irrigation district laws. This has led them to believe that payments would not be enforced in this manner. It would therefore seem fair that they be given a reasonable time in which to raise the necessary funds to redeem title to their lands. The latter statement applies to owners of lands who have an appreciable equity in their holdings. There is a considerable acreage on which the indebtedness will need to be liquidated by proceedings to secure tax title.

49. It may be desirable that the district secure tax title to all lands so far delinquent that the same are subject to tax deed, provided the landowners are given reasonable notice and an opportunity to redeem or to pay up the delinquent taxes on the terms above outlined. In cases where the encumbrances are in excess of the real value of the land when the district obligations are taken into consideration, the transfer of title through tax proceedings (thus clearing up the encumbrances) may be the only practical means of placing the land on a basis where it can be secured by settlers on terms and conditions which will make it practical for the settlers to hold and farm the land without incurring greater obligations for payment than they can reasonably expect to meet.

50. However, it is questioned whether the district should pass title to all of the lands so secured by trust deed. It would seem that the area of land for which such title should be passed should be limited to a certain maximum acreage—say 5,000 acres. This should be enough to amply protect the interests of the bondholders and those interested in refinancing the district and would not take the control so completely out of the hands of the landowners in the district. It should also be understood and provided for that the trustee during the time that such land is held by the trustee will see that it is kept in cultivation and irrigation and that the water charges (district operation and maintenance charges and Government charges necessary to the delivery of water) are paid; otherwise, the drying up of the land and the loss of trees, alfalfa and other improvements would cause a rapid depreciation in the value of the property and failure to pay water charges on this area would result in increasing the operation and maintenance and Government water charges which would be required of the other lands of the district, which would be detrimental to all parties concerned.

51. This feature of the proposed settlement should also provide for the prompt sale of the land by the trustee at moderate prices, so that it will pass into the hands of actual settlers at an early date. It is suggested that this feature of the agreement might be amplified by providing that the trustee will



sell the lands as promptly as possible and will accept the appraised price thereof as fixed by an appraisal committee of three members—one selected by the bondholders' committee, one by the district board of directors, and the third by these two.

#### REPAYMENT OF GOVERNMENT CONSTRUCTION DEBT

52. It is generally agreed that the debt incurred by the district in the construction of the Black Canyon Dam represents the best investment that the Emmett district has made. Payments to the Government under the present contract represent the smallest item of assessment that the landowners must pay. The Government charges being in effect the prior lien and water deliveries being conditional upon their payment, it is probable that the Government could, in the end, force payment of the obligation due to the Government without change in the present terms, but this probably could be done only at the expense of losing a good share of the district settlers. The negotiations between the district and its creditors will be greatly influenced by any action that may be taken by the United States in extending the time for payment. It is very questionable if present arrangements will proceed (without a delay of several years, with consequent loss to the district and the landowners) unless a substantial concession is made in the amount of yearly payments due for Government construction.

53. It will be possible for the Bureau of Reclamation, by making the action it may take contingent upon certain conditions, to insure that certain proceedings are carried out which will be of benefit to the landowners of the district. One of these should be that the lands of the district be surveyed and that future operation and maintenance charges be apportioned on the basis of such new irrigable lands survey. In some cases legal subdivisions which are half or nearly half nonirrigable are being assessed on the basis of the total acreage of the subdivision, which works a hardship on the individuals who own such tracts, and may result in forcing such tracts out of cultivation unless at least partially adjusted. The apportionment of benefits, so far as construction charges are concerned, has been finally confirmed by decree of court and is res adjudicata, and it is therefore probably infeasible to correct such discrepancies in irrigable acreage so far as construction charges are concerned. But the operation and maintenance charges can be reassessed each year, and this would be a material relief in such cases, even though the readjustment is confined to the operation and maintenance charges.

54. As has been indicated, an amount of \$43 an acre on the average will have to be raised on each farm in order to carry on the refinancing problem. On the basis of a Federal land bank loan, which represents the most favorable terms that can be secured, interest and principal payments will call for a yearly output of approximately \$2.50 per acre. This is in addition to taxes, the payment of interest and principal on loans that are already on the farm, and payment of Government construction and maintenance. Operation and maintenance will probably continue to cost \$2 per acre per annum.

#### WATER SUPPLY

55. The water users of the district have for several years claimed to have an insufficient water supply. They have requested the Government to appropriate some \$50,000 for the construction of additional works to supply their irrigation system with 100 second-feet of additional capacity. The district officials desire that an additional pump of about 50 second-feet be supplied for the north side canal (which serves the bench area) and that the siphon connecting the south side canal with the Black Canyon Dam be enlarged to carry at least 50 second-feet more than the amount specified in the present contract.

56. There is some tendency on the part of some water users to blame the Bureau of Reclamation for the alleged water shortage. Detail questioning, however, brings out the admission that the bureau is supplying at least as much water as was agreed upon and that whatever shortage there may be is due to the fact that the district officials underestimated the amount required. The available data indicate that the diversion capacity already provided by the Government exceeds the amount specified in the existing contracts by about 10 per cent. The total seasonal delivery for the lands of the Emmett bench is adequate, the trouble being that there is insufficient capacity to provide all of the water desired during the peak demand, which occurs during the

period from June 15 to July 20. At this season, alfalfa and grain, which are the principal crops of this area, make a maximum demand on the water supply.

57. The percentage of loss from seepage and evaporation is larger than would ordinarily be expected in a canal system of the length and character of the one serving the Emmett bench lands. It is possible that some method may be found of reducing canal losses and thus providing a larger maximum delivery at the land without increasing the amount diverted from the river. If this is feasible at a reasonable cost, it would have material advantages over any plan which involved an increased diversion from the river, as a reduction in the seepage losses from the canal would tend to lessen the danger of seeping the lands, while increased diversion from the river would increase such danger, to some extent at least. Mr. Debler has suggested that the plan of sluicing some clay into the water of the main canal from a clay bank near the head of the canal be first tried to see if this will result in tightening the canals and reducing losses. He estimates that present canal losses of 38 per cent might be reduced to 25 per cent by puddling or silt lining. An additional reason for loss in the lateral system was observed, which would not have been apparent at the time Mr. Debler made his examination. Many of the smaller laterals were observed to be badly clogged with tules, weeds, and other vegetation. A small increase in maintenance cost would enable the district to keep these ditches clean and would no doubt result in a considerable increase in water delivery.

58. If the financial conditions of the district become stabilized, it is to be expected that there will be an increase in the diversification of farm practices. This should result in producing more crops that do not have a maximum requirement for irrigation water at the time of wheat and alfalfa, although the effect of this change in farming practice would not be great. Many farmers blame the spotted condition of their fields to lack of irrigation water, thinking that with a greater supply they could irrigate often enough to bring up the yield of "slick spots" to that secured on deeper soils. It is not believed that this practice would be possible or advisable, for these "slick spots" require the addition of organic matter for their improvement, and it would not be possible to irrigate fields often enough to secure maximum results on such small areas without overirrigating the areas of deeper soil.

59. It is our opinion that the requested addition to the capacity of the north side pumps would result in some increase in crop yields and would be a good investment for the district if the desired increase in water deliveries can not be secured by reducing canal losses. The additional pumps, in our opinion, should be used only during the period of peak demand, otherwise overirrigation may result in harmful waterlogging. It is not believed, however, that the water shortage here is serious enough to be the controlling factor in the problems of this area.

60. In the case of the land served by the south side canal, a larger irrigation supply is believed to be desirable throughout the irrigation season, although the amount now being supplied is considerably in excess of the amount specified in the contracts between the United States and the district. An area of 616 acres is now lying idle and water appurtenant to such land is being used on other areas. The yields, particularly of apples and soft fruits, are limited by water shortage except on farms where the supply is increased by using water charged to idle land. It is our opinion that the need for additional water is greater on the south side than on the bench. Increasing canal capacity would in our opinion result in putting several hundred acres which are now idle under irrigation and would result in marked increases of yield and in the quality of crops produced under the south side canal. It is believed that an increase in the capacity of the south side siphon as described by Mr. Debler would be highly beneficial to the lands served and in case the finances of the district can be adjusted according to the present plan, funds so expended would be readily repaid.

61. From the Government's standpoint, the most serious objection to the installation of the additional pump and the enlarged siphon is that it will take about \$120,000 worth of storage from the Deadwood Reservoir to replace the water which will be taken by this additional diversion if the district continues the enlarged diversion throughout the irrigation season. It is true that the major part of the benefit, particularly on the north side, might be secured by confining the operation of the additional pump to the flood-water season, but it is certain that if the additional pump and the enlarged siphon are

installed for the district, the district will insist upon operating the same throughout the irrigation season or at least throughout the months of July and August, and if we attempt to prevent them from doing so, we will become involved in a continual wrangle with the district every year.

62. In our opinion, the additional diversion capacity should not be installed for the district at all unless the district is willing to make a definite contract to pay a reasonable rental for the storage from the Deadwood Reservoir which will be required to replace the water taken from the river by this increased diversion, as well as the cost of constructing the additional works. The low-water period when storage will have to be discharged from the Deadwood Reservoir, it is believed, will ordinarily last for about 60 days, but may last a month longer in low-water years. One hundred second-feet additional diversion for the Emmett district for a period of 60 days would amount to 12,000 acre-feet. It is our understanding that the estimated cost of the Deadwood Reservoir is about \$1,200,000, but, as the reservoir will not completely fill every year, part of the capacity must be regarded as hold over capacity, and we believe that \$10 an acre-foot probably would be a fair estimate of the cost of construction for the storage which can be drawn out annually.

63. It is evident from the provisions inserted in the last appropriation act that the Deadwood reservoir has been authorized by Congress for the purpose of providing the water necessary to keep up the operation of the power plant, as it is provided that the receipts from the sale of power shall be applied first to the payment of the cost of the reservoir and that no part of the reservoir shall be charged to any irrigation district. While it is our understanding that we can not sell the Emmett district an interest in the reservoir, we do not believe that it was the intention to prohibit the annual rental of surplus storage. An annual rental on the basis of 50 cents per acre-foot, allowing 5 cents an acre-foot for the cost of maintaining the reservoir, would amount to a rental at the rate of about  $4\frac{1}{2}$  per cent of the cost of providing the storage. This would be a very reasonable water rental charge. If Government funds are to be used in installing the additional pump and enlarged siphon an appropriation would be required for that purpose, and the question as to the legal authority to sell or rent such storage to the district can be cleared up by a suitable provision in connection with the appropriation, if it is secured for this purpose.

64. The district claims to have an old water filing of 500 second-feet, made some 20 years ago or more, but the amount of water which the district is now securing is the largest amount ever secured by the district and the unused portion of such filing has undoubtedly lapsed. This contention on the part of the district, however unsound from a legal standpoint, emphasizes the practical importance of avoiding future disputes on this question by refraining from the installation of any additional diversion capacity unless payment for the storage required to replace the additional diversion is definitely provided for in a manner concerning which there can be no dispute.

65. The power privilege at the Black Canyon Dam has been considerably reduced by the amount of water required for the operation of the direct-connected power plant for the district and by the district's diversions above the dam, which are already about 10 per cent in excess of the amount specified in the district's contracts, and a further reduction in the amount of water available for power development, through an additional diversion of 100 second-feet of water, would materially cut into the value of the power privilege which is relied upon to pay half of the cost of the dam, all the cost of the power plant, and also the cost of the Deadwood Reservoir. If the electric pump is installed, the district will no doubt desire to secure power for the operation of the same from the Government at rates similar to those charged the Gem district, as the Government power rates are about half those charged by the Idaho Power Co. for similar purposes. There will be no surplus power available until the Deadwood Reservoir is completed, as the Gem district has a right to all the summer power which can be developed in the low-water season under present conditions and is short a considerable amount in August and the last half of July. This power, however, could be furnished after the Deadwood Reservoir is completed. It would reduce slightly the amount of surplus power that would be available for sale to the Oregon pumping districts of the Owyhee project, but the amount of power required for pumping 50 second-feet of water to an elevation of 23 or 25 feet would not be very large and, in view of the relationship of the Emmett district to the Black Canyon Dam, it is believed that the district

should have this privilege when the surplus power becomes available at the beginning of the irrigation season of 1931.

66. If, before the pumping plant is installed, a test is to be made of the possibilities of reducing canal losses by silting or puddling, it is not likely that the pumping plant could be installed in any event in time to be ready for use prior to the spring of 1931. And even if the silting and puddling experiment were not made, the necessity of waiting for an appropriation for this purpose and the time thereafter required in securing and installing the necessary machinery would make it improbable that the plant would be available for use prior to the spring of 1931, at which time it is expected that the Deadwood Reservoir will be completed and surplus power will be available.

67. In order to avoid all possible disputes as to the amount to be paid by the district annually for power and rental of Deadwood Reservoir water, it is believed that the proposition submitted to the district should be on the basis of the payment of a definite amount by the district annually, if no additional works are constructed and no additional diversions provided for, and a definitely larger amount to be paid by the district annually if the district desires to have the additional pump and enlarged siphon installed. We are suggesting an annual construction payment of \$1.25 an acre, or a total of \$24,000, if no additional works are installed or additional diversions authorized; and an annual payment of \$2 an acre, or a total of \$38,000, if the additional rights and diversions are desired by the district.

68. If the latter plan should be adopted, it is our opinion that the contract should provide that the \$38,000 should be applied first, so far as necessary, to the payment for power (if power is furnished by the Government), second, for the payment of a water rental of 50 cents per acre-foot for all water diverted from the electric pumping plant after the time when we begin the release of storage from the Deadwood reservoir and all water in excess of the 70 second-feet specified in the present contract diverted through the enlarged siphon after the date that we begin the release of storage from the Deadwood reservoir, and the balance of the \$38,000 to be applied on the construction indebtedness of approximately \$813,000 on account of the dam and direct-connected pumping plant, plus the cost of the proposed additional works estimated at \$50,000. If the increased diversions amount to about 12,000 acre-feet during the stored water period, as expected, the rental for stored water would amount to about \$6,000 per year, and if the power bill for operating the pumps should amount to \$2,000, these two items would take about \$8,000 out of the total annual payment of \$38,000. This would still leave about \$6,000 in excess of the \$24,000 which applies if no additional works are provided. It is believed that the proposed \$38,000 instalments would complete the payment of the construction indebtedness, including the additional construction in about 27 years, while if additional works are not provided and construction payments are allowed on the basis of \$1.25 an acre or \$24,000 per year, it would require about 34 years to complete payment.

69. The installation of additional diversion capacity, either by enlargement of the siphon or installation of the electric pump or both, if carried out with Government funds, would have to be conditional upon an appropriation by Congress for this purpose. In case Congress does not make the appropriation for this purpose and the district is sufficiently interested in securing the additional water supply to advance the funds for such purpose, then it is suggested that the annual payment required to apply on the water rental, power bill, and construction charge should be about \$1.75 an acre, instead of \$2 an acre.

70. As the enlargement of the siphon on the south side is considered more important than the installation of the additional pump, it is probable that there should also be provision under which such enlargement of the siphon might be secured without installation of the pump, by paying at the rate of \$2 an acre per year on the south side lands and \$1.25 an acre on the north side lands, or a total of \$27,000 instead of \$24,000.

71. In case of installation of the enlarged siphon without installation of the electric pump, there should also be a slightly different rate in the event the money for the enlarged siphon is advanced by the district or the land-owners from that which would apply if the funds for this purpose are appropriated by Congress, and in that event a rate of \$1.75 on the south-side lands, instead of \$2, and a total payment of \$26,000 might be provided.

72. By providing for a definite annual payment to be made by the district until the entire construction indebtedness has been paid, and deducting from

this payment the amounts which should properly apply for rental of the stored water and payment of power bills, if any, all possible dispute as to the annual payment is eliminated and much contention regarding annual power bills and stored water rental charges would be avoided.

73. The differential between the proposed \$1.25 rate and the proposed \$2 rate suggested above is believed to be justified for the following reasons. The justification for reducing the 6 per cent installments of approximately \$3.75 an acre to the smaller amounts suggested above (if justified at all) is on the ground of ability to pay, i. e., that the reduced rates are as much as can be reasonably expected from the average settler under all of the circumstances. A 2 per cent increase in crops averaging \$40 an acre would amount to more than the 75 cents differential. Allowing for the increased cost of handling the heavier crop, a 5 per cent increase in crop value as the result of the additional water supply (which is thought to be probable) would make it easier to meet the \$2 installment with the additional water supply than the \$1.25 installment without it. So that if the \$1.25 rate is correct without the additional water supply, a rate lower than \$2 could not be justified on the ground of ability to pay if the additional water supply is furnished and a 5 per cent increase of crops thus brought about.

74. Furthermore, it is believed that if it is not generally agreed that the increased water supply would produce at least a 5 per cent increase in crop values, and probably a 10 per cent increase in crop values, the additional works and additional water should not be provided for the following reasons: (1) Increased use of water would necessarily increase to some extent the danger of seepage.

(2) The reclamation fund is limited and greatly needed on other projects.

(3) The increased water supply for the Emmett district would involve using some of the surplus power from the Government power plant and diverting an additional 100 second-feet above the dam would reduce by 100 second-feet the water flowing over the dam and thereby reduce the extent and value of the power privilege at the dam and the amount of power which can be developed at that site to the extent of whatever amount of power could be developed by the 100 second-feet going over the dam if not so diverted.

The cheap surplus power available from the Government plant is greatly needed for relief of other distressed communities. While we feel that the Emmett district should be allowed to use some of such power, the diversion of reclamation funds and power resources for the benefit of the Emmett district should be allowed only in the event that the benefit to this district is both clear and material. For these various reasons, we feel that if there is any serious question that crop values would be increased sufficiently by the additional water supply to warrant the proposed higher annual payments, such additional construction and additional water supply should not be attempted.

#### SECURITY FOR PAYMENTS TO BE MADE UNDER ADJUSTMENT CONTRACT

75. The security plan provided in the contract between the United States and the Gem district has worked out remarkably well and that district has never failed to meet its entire obligation to the Government promptly when due, although the payments from the Gem district to the Government amount to about twice as much as those from the Emmett district and are collected from a smaller acreage of land, while the Emmett district has generally been delinquent both on maintenance and construction charges.

#### SETTLEMENT

76. The main body of the district has been settled for a period of upward of 20 years. While the present assessed area is in excess of the actual area irrigated, there are probably not more than 300 acres of good farming land which are not included in the operating farms. The district records show that 616 tax notices are sent out annually. As nearly as could be determined, the area is actually farmed by about 350 families, of which 200 are owners. The main body of the district is divided into small holdings, but in many instances two or more tracts are combined for farming operations. Due to the unfavorable economic condition of the district, the average farmer is operating his place without much consideration for the future. Until an adjustment is made, he will consider his tenure of a temporary nature and will farm to get what he can from the land each year. In general, settlement is not a controlling

factor in this district. The need is not for more settlers but for an adjustment of financial difficulties which will enable those now on the land to prosper and to meet their obligations.

#### IRRIGABLE LANDS

77. As has been indicated, the irrigable lands of the district are naturally divided into two areas, known as the "slope" and the "bench." These areas will be discussed here separately.

#### BENCH

78. The bench includes a compact body of land with a gross area of approximately 17,500 acres. It is generally of smooth topography, particularly in the eastern portions. The portion of these areas lying in range 3 is more rolling than the remainder. There are two drainage courses of considerable size running through this area. The first is Bissell Creek, cutting the area in a southwesterly direction at about its center, and Sand Hollow near the western extremity.

79. The bench soil is generally a fine sandy loam in texture and, particularly in the eastern half of the area, is underlaid by hardpan at moderate depths. This hardpan is above a rather thick layer of porous gravel and sand which rests on the underlying country rock. The soil is heavier in the western part of this area; the depth to hardpan is greater and the gravelly layer less prevalent. Many of the fields, particularly in the eastern part of the area, are spotted with so-called "slick spots." These are areas where compact heavy soils or hardpan layers come near to the surface. In such areas the effective root zone and soil water reservoir is limited to the depth above such compact strata. These spots require irrigation at more frequent intervals than do areas of deeper and more friable soil. On lands of this sort crops have a spotted appearance, the straw generally being short and the grain of poor quality where slick spots occur. Application of barnyard manure, clover chaff, and straw improves these slick spots and, where it has been possible to irrigate frequently, fair yields are secured. Even under most favorable farming conditions, however, crops secured on these spotted farms yield less than where soil conditions are more favorable and this spotted condition can not be fairly attributed to water shortage alone. The soils of the bench as a whole are considered to be of good average quality but not to have the productive possibilities of some of the more favored districts of southern Idaho, such as the Gem irrigation district or the Twin Falls areas.

#### SLOPE

80. The slope includes some 5,000 acres of land extending from a point less than a mile from the diversion dam, a distance of about 20 miles along the south side of the valley. With the exception of a flat of heavier land just east of Emmett, the soil is very sandy. The water-holding capacity is low and seepage losses, both from the main canal and in farm laterals are high. The topography is generally steep and the air drainage favorable. The resulting freedom from frost makes this area a better fruit-raising section than the rest of the valley. In fact, this part of the Emmett district compares favorably as a fruit-raising section with any area in southern Idaho.

#### DRAINAGE

81. The only large body of land needing drainage occurs just below the break in topography between the flat and steeper lands lying east of Emmett. A portion of this area has recently been drained. An open ditch constructed in 1928 serves about 200 acres directly and protects additional lands which are still productive but have a high water table. This area was estimated by the Federal land bank as including 1,500 acres of seeped land. It is believed that with the area which has been drained excluded, the seeped area here will not exceed 1,300 acres. In addition to this, there are certain small areas on the bench where seepage has occurred. These are in the flat stream bottoms of Bissell Creek and other drainage courses. There is also a small area just east of the bench and north of the Payette River. These areas are practically all too small in extent to be economically drained but the large area east of Emmett, to which reference has been made, could be improved by the construc-



tion of additional drainage ditches. The total area in the district which is nonproductive on account of high-water table is estimated to be 1,800 acres. Of this, at least 800 acres can probably be reclaimed by drainage, but under present conditions it would be unsafe to include any of it with the irrigable area.

82. An area of about 1,584 acres of Emmett district land lying under the south canal is included in drainage district No. 1 of Gem County, Idaho, and is assessed for contributing damages.

#### IRRIGABLE AREAS

83. Assessments for bond interest and Government construction charges have been allocated to 22,546.46 acres, which has been presumed to be the irrigable area of the district. This includes the cropped area below present canals and also some 900 acres lying above such canals. Of this area, approximately 400 acres are being assessed at 50 cents an acre as an operation and maintenance charge and are not being supplied with irrigation water. Also, within the main bodies of irrigation land there are rough areas, including the steep breaks of water courses and the steep edge of the bench, which could not under any economical scheme be placed in crop but that are being assessed full amounts for operation and maintenance together with Government construction and bond interest. Also, the areas of waterlogged lands described in paragraph 81 are being assessed. It was not possible in this study to make an accurate determination of the irrigable area.

84. An estimate of lands which should be excluded from the irrigable area of the district was made in 1926 by representatives of the Federal Land Bank and their report shows the following acreages which they recommend for exclusion:

	Acres
Wet, seeped and alkali lands.....	1,994
Lands above Emmett district canals (no canal service).....	389
Rough, broken, steeply rolling non-irrigable lands.....	837
<b>Total nonproductive lands.....</b>	<b>3,220</b>
<b>Remaining gross productive area of district.....</b>	<b>19,552</b>

A brief reconnaissance has been made in an effort to check these figures. It is believed that the exclusions have been conservatively estimated and that the accurate irrigable area is still lower than shown in this estimate. There has been a slight decrease in the area of wet land but more should be excluded as being too rough, broken, or steep to be farmed. It is believed that a careful survey of the irrigable lands would show that not more than 19,000 acres are of a quality capable of repaying water charges. This is over 3,000 acres less than the area over which the bonded debt is now spread and it is believed to be desirable that the irrigable acreage be determined by survey and that future operation and maintenance assessments and, if practical, also construction and bond assessments, should be readjusted on the basis of irrigable area.

#### CROP AND LIVESTOCK PRODUCTION

85. The results of a census taken by the Emmett irrigation district in July, 1929, are given in the following table:

	Acres	Per cent cropped area
Area served by north canal (bench):		
Alfalfa and clover.....	6,986	47
Corn and pasture.....	2,051	14
Grain.....	4,614	31
Orchard.....	1,183	8
<b>Total cropped area.....</b>	<b>14,834</b>	
Area supplied with water but not farmed.....	1,581	
Area assessed but not supplied with water.....	1,305	
<b>Total, north side.....</b>	<b>17,720</b>	



	Aeres	Per cent cropped area
Area served by south canal (slope):		
Alfalfa and clover.....	890	23
Corn and pasture.....	308	8
Grain.....	488	12
Orchard.....	2,248	57
Total cropped area.....	3,934	
Area supplied with water but not farmed.....	616	
Area assessed but not supplied with water.....	531.97	
Total, south side.....	5,081.97	

86. It will be noted that in the portion of the district served by the south canal 57 per cent of the cropped area is in orchard, 23 per cent is in clover or alfalfa, the remainder being in miscellaneous crops, including pasture, grain, melons, etc. This area is known as one of the best soft-fruit sections in the State of Idaho. The warm sandy soil combined with good air drainage is adapted to the production of tender early-season crops. Prunes, peaches, apricots, cherries, and apples are the fruit crops produced, and while the acreage is not extensive a considerable tonnage of watermelons and cantaloupes are produced each year. Local growers consider cherries their most profitable crop and a number of new plantings of cherries were observed. It is to be expected that the area in fruit would be increased if a more adequate water supply were available for this portion of the district. This type of farming has been carried on practically since the district was organized and it is expected that present practices will continue in the future on all lands where climatic conditions are favorable.

87. On the Emmett bench area and in the flatter portion of the slope area (such as the lands immediately east of Emmett) there is less fruit production. District figures show that only 8 per cent of the bench is in orchard, 47 per cent is in alfalfa and clover, 31 per cent in grain, and 14 per cent in corn and pasture. With the exception of the fruit-producing portions, to which reference has been made, the district is best suited to the production of forage, grain, and tame pasture crops which are best marketed through dairy products. The most prosperous farms and those on which the farmer's finances were found to be in the best condition are being used for this type of farming. Clover seed is probably the best cash crop produced. Very few potatoes were planted this year, although we are informed that under more favorable market conditions more potatoes are raised.

88. The district has kept no records of crop yields obtained, but in the following table is listed the average of yields reported by some 20 farmers from whom such information has been obtained. Yields as reported are for the season of 1928:

Crop	Number reporting	Acre- age	Average yield per acre	Value per acre
<b>BENCH</b>				
Alfalfa.....	10	25.5	3.5 tons.....	\$38.65
Apples.....	4	5	161 bushels.....	132.00
Barley.....	7	12.5	37 bushels.....	30.00
Clover seed.....	9	15	4 bushels.....	54.55
Corn.....	3	4	57 bushels.....	55.33
Oats.....	5	7	48 bushels.....	26.00
Pasture.....	9	7		64.00
Potatoes.....	1	1.5	150 bushels.....	50.00
Prunes.....	1	20	5.1 tons.....	95.00
Wheat.....	9	20	37 bushels.....	39.75
<b>SLOPE</b>				
Alfalfa.....	1	14	2.5 tons.....	27.50
Apples.....	4	10.5	242 bushels.....	198.50
Apricots.....	1	8	2,500 pounds.....	80.00
Cherries.....	2	4.3	3,800 pounds.....	300.00
Corn.....	1	6	21 bushels.....	20.00
Peaches.....	3	5	222 bushels.....	97.67
Prunes.....	1	22	3.9 tons.....	81.00
Strawberries.....	1	2		200.00
Watermelons.....	2	4.5		62.50

## TYPICAL FARM PROGRAM

89. The following is presented as a farm set-up, showing the average of various crops that a good average farmer should raise, together with the livestock on such a farm, yields obtained, investment expense, and a statement of one year's returns for operation costs:

*Typical farm program, Emmett Bench 80-acre farm, one year's operation*

Cropping plan	Acre yield	Livestock
5 acres farmstead, ditch, etc.....		4 horses; 10 milk cows; 1 bull; young stock, 5 yearlings, 5 calves, 3 brood sows, 200 chickens, 15 ewes.
15 acres alfalfa..... tons	3.5	
10 acres clover..... bushels	4	
20 acres wheat..... do	40	
10 acres corn..... do	40	
5 acres oats..... do	45	
5 acres barley..... do	50	
10 acres tame pasture.....		

*Investment*

Improved farm.....	\$5,000
Implements.....	1,600
Automobile.....	750
4 horses.....	300
10 cows.....	1,000
1 bull.....	250
3 sows.....	90
15 ewes.....	150
200 chickens.....	200
<b>Total.....</b>	<b>9,340</b>

*Yearly returns*

<b>Crops:</b>	
Clover seed, 40 bushels, at \$12.....	\$480
Wheat, 750 bushels, at \$0.90.....	675
Barley, 120 bushels, at \$0.60.....	72
	<b>\$1,227</b>
<b>Stock:</b>	
Sale of cows and calves.....	250
30 (200-pound) hogs, at 9 cents per pound.....	540
2,500 pounds butterfat, at 45 cents per pound.....	1,125
15 (70-pound) lambs, at 11 cents.....	115
150 pounds wool, at 40 cents.....	60
200 chickens (eggs and poultry).....	200
	<b>2,290</b>
	<b>3,517</b>

*Yearly expense*

Labor (hired).....	650
Seed.....	110
Repairs and upkeep on equipment and lodgings.....	350
Threshing and harvest expenses, grain.....	85
Threshing clover seed.....	70
Taxes (land, \$2.17 per acre; personal, \$40).....	215
Operation and maintenance (\$2 per acre).....	160
Government construction (\$1.25 per acre).....	100
Family, living, recreation, etc.....	1,000
Automobile operation.....	150
Automobile depreciation.....	150
	<b>3,040</b>

Balance, for interest, profit, payment of personal debts, and district interest, bond and judgment assessments.....	477
---	-----

90. It will be noted that this program is based mainly on a dairy-producing scheme. Returns from dairy products are supplemented by returns from the sale of clover seed and wheat, together with some return from hogs, lambs, and poultry. The gross income, according to this tabulation, would be slightly over \$3,500 per year. The expense, including family living, is slightly in excess of \$3,000 per year. The latter item includes labor expenses, taxes, operation, and maintenance, government construction, and other items necessary for the production of crops. It does not allow income for the labor of the family except as this is reflected in the family living item. According to this calculation, a farmer would have about \$475 to be used for interest payments, the reduction of personal debts, and the payment of his share of the irrigation district's indebtedness.

91. This program is based on general information obtained in the district. It does not represent an extensive enough study to be considered as accurate but serves to demonstrate the type of farming to which the area is adapted and the general results that may be expected. The most successful farmer will do better than this program indicates, but on the other hand, many will not do as well.

#### RECOMMENDATIONS

92. It is recommended:

First. That conditional upon completion of the proposed settlement with the creditors (including the ratification by the bondholders' committee of Mr. Haga's interpretation of the proposed agreement as set out in paragraphs 46 and 47 of this report, compliance by the Federal land bank and the landowners and other interested parties with the requirement in regard to raising the necessary funds to comply with the conditions of the proposed settlement, and the consent of all parties to the provisions suggested in paragraphs 48 and 50 of this report), a supplemental contract be made with the district under which the construction payments shall be on the basis of \$24,000 per year (which is \$1.25 per acre in 19,000 acres) until the entire construction indebtedness is paid, provided no additional works are constructed for the district and there is no increase in the present diversions for district use.

Second. If the district desires additional works and an additional water supply after trying the puddling and silting plan recommended by Mr. Deblor, and if Congress makes the necessary appropriation to provide such additional works, that the same be installed by the Government, and in that event that the annual payments to be made by the district (exclusive of maintenance on the dam) be in the amount of \$38,000 per year (instead of \$24,000 per year) and that said \$38,000 be applied first to pay the power bill, if power is furnished by the United States; second, to pay rental at the rate of 50 cents per acre-foot for all water diverted through the electric pump after the date that stored water is released from the Deadwood Reservoir and 50 cents per acre-foot for all diversions through the enlarged siphon after that date in excess of the 70 second-feet specified in the existing contracts; and, third, that the balance thereof be applied to the construction indebtedness, including the cost of the additional pump and enlarged siphon.

Third. That if no appropriation is made for this purpose by Congress but the necessary funds for installation of the additional pumping plant and enlarged siphon are provided by the district, then the annual payment to be made by the district should be on the basis of \$33,250 (instead of \$38,000), which would be equivalent to \$1.75 per acre on 19,000 acres.

Fourth. That if the enlarged siphon is provided with funds appropriated by Congress but the proposed additional pump is not provided, that the annual payment be on the basis of \$27,000, being approximately at the rate of \$1.25 per acre for the North Side lands and \$2 per acre for the South Side lands.

Fifth. That if the additional pump is not installed and the enlarged siphon is provided with funds advanced by the landowners or the district, then that the annual payment be \$26,000 per year, or approximately \$1.75 per acre for the South Side lands and \$1.25 per acre for the North Side lands.

Sixth. It is further recommended that the adjustment contract with the Emmett district provide for the furnishing of security by the district and the landowners in the same manner provided in the case of the Gem district, unless the annual construction payment is paid in advance prior to the beginning of the irrigation season of the year when such payment falls due.

## KING HILL IRRIGATION DISTRICT, IDAHO

(By B. E. Stoutemyer, district counsel, and W. W. Johnston, associate reclamation economist, Bureau of Reclamation)

The King Hill district, with an estimated irrigable acreage of 10,000 acres, contains about 1 per cent of the total of about 1,000,000 acres for which the Government is now furnishing water in the State of Idaho under the reclamation act and the Warren Act. This district has come into prominence out of proportion to its relative size and has been designated for special investigation and report on account of the fact that it is at the present time the one Idaho district which is not meeting its obligations to the Government.

## HISTORICAL

This project was not constructed as a Government project. It was constructed originally by Mr. C. H. Hammett, beginning in 1908. The irrigation works and water-right mortgages were put up for sale in the foreclosure proceedings of creditors of Mr. Hammett to satisfy payments due on bonds issued in 1914 being purchased by the State of Idaho on about February 15 of that year. This transaction was followed by a period of settler and State operation. In the spring of 1917 the United States Government was induced to begin a series of appropriations for the reconstruction and operation of the system, it being turned over to the settlers on January 1, 1926. Since that time the system has been operated with good success from the standpoint of water delivery, but the warrant indebtedness has only been reduced by a small amount and construction payments due the United States are entirely delinquent.

## DESCRIPTION

The King Hill Irrigation district includes an irrigable area now fixed at 10,000 acres, which is scattered in a number of irregular bodies along the Snake River in the vicinity of Glenns Ferry and King Hill, Idaho. The irrigation supply is in natural flow from the Malad River, diverting from that stream near the town of Bliss, Idaho. The irrigation system includes about 100 miles of canals and laterals, of which some 28 miles are included in concrete and wooden structures. Most of the main canal is sidehill construction on loose, easily washable soil, which makes very poor foundation material. Washouts have been frequent, particularly in sections where permanent concrete construction has not been put in.

## PRESENT CONDITION OF DISTRICT AND SETTLERS

The district now finds itself in the position of owing \$1,489,969 to the United States, of which \$17,300 was due on December 31, 1928, and is totally delinquent. Some \$48,226, plus about \$25,000 unpaid interest, is owed on deficiency warrants originally issued for material and services received many years ago, but subsequently renewed to avoid the bar of the statute of limitations. The district officials have only with difficulty been able to collect enough for operation and maintenance. Last year the operation and maintenance assessment was \$4 per acre. This year it is \$5. They claim to need an amount approaching \$240,000 to be used in replacing old siphons and flumes and for canal lining, during the next five years. It will hardly be possible for such an amount to be collected in addition to that required for operation. The district is without credit, even to the extent that the manager can only purchase lumber for the use of the district by having it charged to his personal account, since the lumber company will not trust the district.

## CONDITION OF SETTLERS

The district records show that there are now 185 irrigated farms, of which 115 are operated by owners and 70 by tenants. A large part of the landowners settled in the early stages of the district's development, and most of the remainder came in during the war period. The landowners are generally of a high type and most of them settled with adequate capital. The average original capital of seven owners questioned on the point was \$7,500.

The tenant population is mainly of second-rate farmers who are poorly equipped and stay generally but a season. The unsettled financial condition

of the district has led absentee owners to refrain from expending funds necessary to keep their farms in shape to be attractive to high-class renters.

The district is badly in need of "new blood" both in the form of tenants and purchasers. There seems little chance of securing additional settlers until the district finances reach a point that moderate yearly water assessments will meet its obligations. A prospective settler could not be fairly advised to settle on the King Hill in its present condition. If sufficient improvement can be effected, a settler suited to dairying, sheep raising, or poultry production will find the better part of the King Hill project a desirable place to make a home. A new settler, in order to have a fair chance of success on the King Hill district, would need around \$6,000 in capital.

#### CREDIT

The Federal land bank and other farm-loan institutions do not make loans on lands in the King Hill district. The only credit available is in the form of short time bank loans at 10 per cent interest. The amount, also the length of the loan depend on the character credit of the individual and his assets in the form of stock and equipment. There is little chance in the improvement of the credit situation until the district reaches a more stable financial condition and until a reserve is built up to take care of canal breaks which are a constant threat to the continuity of water delivery.

#### AGRICULTURAL CONDITIONS—IRRIGABLE LANDS

At the time of original construction the irrigable area of the King Hill district was estimated at 30,000 acres. This was reduced to 16,376 acres by the Reclamation Service in 1918 and to 10,000 acres irrigable and some 2,000 acres suspended in the adjustment act of 1926. The district officials now claim that not over 8,000 acres can be supplied and that no more than this is worth farming. Only 6,525 acres were irrigated and cropped during the season of 1928. Time has not been available in this investigation to make a quantitative examination of the irrigable area but it is believed that 8,000 acres is more nearly correct than the previous estimates. In fact, if the King Hill district were being classified in a new project, much of the 8,000 acres would properly be classed as non-irrigable on account of the coarse texture of the soil and the excessive irrigation requirement.

With the exception of the Pasadena Basin and certain other small areas where more favorable soils are found, the soil in a coarse sandy loam generally from 1 to 4 feet in thickness overlying coarse basaltic sand and fine gravel. The water-holding capacity of the surface soil is low, and that of the subsoil practically negligible.

The water deliveries in 1928 averaged 9 acre-feet per acre. Some farms used over 12 acre-feet. The duty of water could be increased by better preparation of the land for irrigation, by shortening the length of run by substituting the strip border method of irrigation for furrow and wild flooding on the smoother lands, and by increasing the organic matter content. Even under the most advanced methods of irrigation farming, the irrigation requirement of these lands will remain high. Frequent irrigations are necessary and this increases the cost of production. Unavoidable percolation losses occur and this leaches out fertility.

Alkali indications are practically nonexistent and not more than 100 acres is affected by seepage. It is not likely that seepage difficulties will be increased to any significant extent.

#### CROPS AND CROP YIELDS

While this project is climatically suited to a wide range of crops, specialized production of early crops has not developed. The main crops are alfalfa, early potatoes, corn, and pasture. Onions and other truck crops come on earlier than in most any other place in Idaho, but find serious competition from other sections of the country. Beans and tomatoes blight badly. Some success is attained with clover and alfalfa seed, but production of the latter crops is not as profitable as in portions of the State with somewhat higher elevations. Alfalfa yields are reported to have been lowered to a considerable extent during the past two or three years due to what is locally called a "bacterial" root rot. The State agriculturists are undecided as to the exact

nature and seriousness of this disease, but it is limiting alfalfa production in this project, particularly on old stands.

Following is a statement of a cropping and livestock program to which the region is believed to be adapted, together with the results that could be expected by a good average settler who is properly financed.

*40-acre farm*

Acres		Yield	Livestock
2	Farmstead, etc.		
5	Permanent pasture for 2 cows		
25	Alfalfa..... tons	3½	2 sows; 10 cows; 1 bull; 25 ewes; 200 chickens; 2 horses.
4	Corn..... bushels	55	
4	Early potatoes..... do.	175	

*Investment*

Land, buildings, and equipment		Livestock	
40 acres of land, at \$10.....	\$400	10 cows at, \$100.....	\$1,000
Levelling, ditching, etc., at \$25.....	1,000	1 bull, at \$240.....	240
House.....	850	25 ewes, at \$10.....	250
Barn.....	350	200 hens, at \$1.....	200
Chicken house.....	200	2 sows, at \$30.....	60
Cistern, sheds, etc.....	250	2 horses, at \$75.....	150
Automobile (used).....	550		
Farm and dairy equipment.....	1,000		
Subtotal.....	4,600		1,900
Total for land, equipment, and livestock.....			65,000

*Returns*

700 bushels early potatoes, at 70 cents per bushel.....	\$490
2,200 pounds butterfat, at 43 cents.....	946
1,760 pounds lambs, at 11 cents.....	194
250 pounds wool, at 40 cents.....	100
3,400 pounds hogs, at 10 cents.....	340
2,200 dozen eggs, at 26 cents.....	575
Total gross income.....	2,645

*Yearly expenses*

Auto operation and depreciation.....	\$215
Labor (mainly for harvesting potatoes).....	220
Seed.....	110
Feed purchased.....	150
Repairs, upkeep, depreciation, gasoline, etc.....	425
Taxes, State and county.....	80
Water assessments, at \$25 per acre.....	200
Family living, doctor, recreation, etc.....	1,000
Total expense less water charge and interest.....	2,400

Balance to pay for interest, improvements, and contingencies, \$245 per year. This is less than 4 per cent interest on the investment.

From the above calculation which represents a better system of farming than the average farmer on the King Hill project is now following, or is financially able to follow without additional credit, it is quite evident that high water assessments can not be paid on this district. This is further attested by the history of collections that have heretofore been made. Last year the operation and maintenance was \$4 and an additional assessment of \$1.73 per acre was

made for construction. None of the latter assessment was collected. It is believed that \$5 per acre is the maximum that can be collected over a period of years as the base charge. Farmers using excess irrigation water would have to meet somewhat high charges.

## IRRIGATION-DISTRICT FINANCES

*Additional construction requested.*—The following listed construction is presented by District Manager F. L. Kinkade as being necessary for the continued operation of the district:

*Siphon replacements based on 8,500 acres of area*

## Replacements for 1929:

McEchern siphon 100 feet, 100 feet pipe-----	\$1, 500
Glenns Ferry siphon, 1,000 feet, 48-inch pipe, area 4,055 acres-----	6, 000
Canyon Creek siphon, 800 feet, 48-inch pipe, area 3,800 acres-----	5, 000
Cold Springs siphon, 200 feet, 42-inch pipe, area 1,800 acres-----	850
Slick 24-inch machine-banded pipe, 2,000 feet, area 717 acres-----	8, 500
Lateral 5E, 4,660 feet 12-inch pipe to be replaced with 2,330 feet 18-inch pipe, area served, 213 acres-----	4, 500
Head end siphon repairs, area served, 8,500 acres-----	250
	<hr/> 26, 600 <hr/>

## Replacements for 1930:

Head End siphon-----	10, 000
Canyon Creek-----	9, 000
Slick, 24-inch machine-banded pipe-----	8, 500
	<hr/> 27, 500 <hr/>

## Replacements for 1931:

Basin siphon-----	13, 000
4-mile and McEchern half round flumes-----	3, 000
McEchern siphon-----	4, 000
	<hr/> 20, 000 <hr/>

## Replacements for 1932:

Glenns Ferry siphon-----	7, 000
Hafer siphon-----	3, 000
Brady siphon-----	2, 500
King Hill 12-inch machine-banded pipe-----	2, 500
Slick 24-inch machine-banded pipe-----	8, 000
	<hr/> 23, 000 <hr/>

## Replacements for 1933:

Head End siphon-----	4, 000
Deer Gulch siphon repairs-----	500
Slick machine-banded pipe-----	8, 000
Sellman Pipe Line, 10-inch, 1,330 feet-----	1, 500
Prescott Pipe Line, 12-inch, 2,000 feet-----	3, 400
	<hr/> 17, 400 <hr/>

## Concrete lining to be done in 1929:

Main canal, 1,500 linear feet-----	10, 000
Main canal extension, 1,800 linear feet-----	7, 500
	<hr/> 17, 500 <hr/>



Approximate concrete lining to be done in next five years:

Main canal, 6,000 linear feet.....	40, 000
Main canal extension, 10,000 feet.....	45, 000
Lateral system.....	2, 500
Concrete transition to McEchern and Alkali siphon; repairs to Cassia and Big Pilgrim spillways; replacement of wooden headgates that decay in 3 to 5 years with concrete; also checks and drops to be replaced with concrete structures.....	20, 000

The above is approximate estimates of the King Hill Canal system during the next five years.

The above tabulation shows the following yearly requirements for new construction:

	1929	1930	1931	1932	1933	5-year average
Siphons.....	26, 600	27, 500	20, 000	23, 000	17, 400	22, 000
Canal lining, etc.....	17, 500	21, 500	21, 500	21, 500	21, 500	20, 000
Total.....	44, 100	49, 000	41, 500	44, 500	38, 900	43, 000

Whether the amounts estimated by district officials, as set out above, will be needed in the near future for reconstruction purposes, is an engineering question which we recommend be passed upon by an engineering board. Mr. R. J. Newell has estimated the requirements at a somewhat smaller amount.

It is also believed that the question, whether the indebtedness to the Government should be written off in its entirety or construction charges merely postponed six or eight years, turns on the question whether conditions are such that operation and maintenance charges as high as \$5 per acre per year will be permanently and continuously necessary, or whether operation and maintenance charges a dollar or two less than \$5 per acre can be expected six or eight years hereafter when the renewal of the siphons has been completed. This is an engineering question which should also be passed upon by the same engineering board which passes upon the question suggested above.

Five dollars per acre per year is believed to be about as much as the water users can pay for water unless crop values increase, and the possibility of making construction payments depends upon the possibility of reducing the maintenance cost below that figure or a material general increase in crop prices.

Plans No. 1, No. 2, No. 3, and No. 5 are on the assumption that the \$5 per acre charge can not be reduced.

Plan No. 4 is on the assumption that the operation and maintenance charge could be reduced to \$3.56 if the Government furnishes funds for reconstruction of certain works.

Plan No. 6 assumes that construction payments will be postponed for eight years, and that after that time there will be a reduction in the \$5 operation and maintenance charge on account of the completion of the renewal of the siphons and some other work, or possible also a general increase of 10 per cent in crop prices by that time.

*PLAN No. 1.—Payment of all debts and assessments for new construction as needed*

Operation and maintenance.....	\$26, 000
New construction.....	43, 000
Government construction charge.....	8, 650
Warrant reduction, say.....	6, 000
Sinking fund to care for emergencies.....	2, 500
Total.....	86, 750

Per acre basis of 8,000 acres, \$10.84, say, \$11.

Without Government payment or warrant payment, \$70,100.

Per acre, \$8.76, say, \$8.75.

As has been pointed out in another section, an annual assessment of \$5 per acre on 8,000 acres is believed to be as much as the lands of this district will stand as total annual water charges. It would, therefore, be impossible for the district to follow out the above program. A number of alternative pro-

grams have been suggested by different water users and district officials. These are described and assessments worked out as follows:

**Plan No. 2.**—Government to cancel all charges, which would reduce the annual costs:

Total charges as set out in plan No. 1.....	\$86,750
Less Government construction charges.....	8,650

Annual cost plan No. 2.....	78,100
Or \$9.72 per acre.	

**Plan No. 2a.**—Cancellation of Government debt and warrant debt:

Reducing annual cost to \$72,100, or \$9 per acre.

**Plan No. 3.**—Government to appropriate \$240,000 for supplemental construction:

Operation and maintenance.....	\$26,000
Government construction.....	8,650
Government supplemental construction, \$240,000 repayable in 20 years.....	12,000
Warrant repayment, say.....	6,000
Sinking fund to care for breaks.....	2,500

Total annual cost.....	55,150
Per-acre basis, 8,000 acres, \$6.89; say, \$6.90.	

**Plan No. 4.**—Government to appropriate \$240,000 for supplemental construction and accept as repayment difference between other costs and \$5 per acre per year until paid; warrants considered canceled or outlawed:

Operation and maintenance.....	\$26,000
Sinking funds for breaks.....	2,500

Total annual cost.....	28,500
------------------------	--------

Per acre.....	\$3.56
Left for Government payment.....	\$1.44
Years to repay Government costs.....	150

While plan No. 4 looks workable on paper, it is doubtful if full repayment could be obtained even with these favorable terms. Obstacles which will affect future collections and which make future operations uncertain are as follows:

(a) A main canal 52 miles long and 28 miles of the system being concrete and wooden structures, requiring large expenditures for operation.

(b) An irrigable area of about 8,000 acres, with only 6,500 acres irrigated and cropped, upon which must fall the whole burden of project indebtedness.

(c) A porous soil with low water-holding capacity, requiring a large amount of water per acre (average, 9 acre-feet in 1928).

(d) Poor foundation material for canals and structures, making it necessary to maintain and extend concrete-lined sections and siphons. Foundation failures are to be expected, particularly when full water supply is carried.

(e) A system which is hazardous to operate, there being constant danger of breaks which will cause serious crop losses. Without an emergency fund total crop failure may result. With an adequate fund only partial losses will occur.

(f) A question of whether the water users intend making a serious effort to pay the Government debt, this being raised by the fact that not a single water user paid his construction assessment in 1923.

#### CANCELLATION OF THE GOVERNMENT DEBT

The desirability of canceling or suspending the construction charges of the King Hill district depends to a large extent on matters of policy and on the effect on reclamation as a whole, which are matters that do not come within the scope of this investigation. It is believed that economic conditions are such that moneys due the United States will not be collectable under the present contract, and whether they will be collectable by making additional appropriations and contracting for repayment under as favorable terms as in plan No. 4 is questionable because of reasons discussed above.

Any plan for deferment of charges or cancellation of construction charges should be made contingent on a similar disposition of deficiency warrants. The

holders of these warrants are mainly people whose future is almost as dependent on the future of the King Hill district as is the case with landowners of that district. Many of these were bought for speculative purposes for as little as 30 cents on the dollar. The future of the district is as dependent on the disposition of the warrants as upon the disposition of the debt to the United States. If these two debts were disposed of it might be possible for the district to maintain their irrigation system by use of private capital from institutions and individuals whose finances will be directly affected by the success of the district. This would be particularly true if they can get along with a more modest reconstruction program than planned. An annual assessment of \$5 per acre with the Government debt and warrants canceled would make the following program possible:

Plan No. 5.—Annual assessment of \$5 per acre with Government debt and warrants canceled:

Operation and maintenance-----	\$26, 000
Sinking fund for breaks-----	2, 500
Subtotal-----	28, 500
Reconstruction-----	11, 500
Total annual cost-----	40, 000
Per acre-----	5. 00

The above plan would give about the same amount for reconstruction as was used last year, or, if a part were paid on low interest-bearing bonds, a much larger sum would be available.

Plan No. 6.—No construction payments for eight years and no warrant debt:

Operation and maintenance-----	\$26, 000
Sinking fund for breaks-----	2, 500
Construction payments, \$1.50 on 8,000 acres-----	12, 000
Total annual cost-----	40, 500

Reconstruction to be completed during the next eight years while Government charges are suspended.

If the present ability to pay remains unchanged at \$5 per acre on 8,000 acres the receipts would fall short by \$500 of meeting the requirements under this assumption, but if a 10 per cent increase in crop prices should occur in the next eight years, which is not improbable, this increase, amounting to \$2.80 per acre, would probably increase the amount which could be paid for water \$1 per acre or \$6 instead of \$5, and leave a margin of about \$7,500 over the amount required to meet construction and operation and maintenance charges.

In case it is the policy of the Bureau of Reclamation to recommend any charge-off or suspension of construction charges, it is recommended that as consideration for such action the following agreements be secured.

1. The King Hill district to agree never to ask the United States to make additional appropriations from the reclamation fund.

2. Agreements be secured for the same disposition of deficiency warrants as is made of the debt due the United States.

3. An annual assessment of not less than \$5 per irrigable acre be made until such a time as a surplus emergency fund of \$50,000 has accumulated.

4. A minimum of \$2,500 per year be put into such emergency fund and similar disposition be made of all funds collected which are not required for operation and maintenance and construction or payments on debts of the district.

The investigation reported herein has led to the following conclusions:

1. That \$17,300 is now delinquent on the construction debt due the Government; deficiency warrants exist in the amount of \$48,226, with some \$25,000 interest due; the district officials estimate a need of \$240,000 for reconstruction during the next five years. These payments plus operation and maintenance would require a yearly assessment of \$11 per acre.

2. That \$5 per acre represents the maximum per acre assessment that will be collectable for water over a period of years unless there is an increase in crop value.

3. That the above assessment would allow only \$1.44 per acre annually for payment to the Government, warrant repayment, and reconstruction.

4. That economic conditions are such that the district will be unable to repay the Government debt under the present contract.

5. That this debt might be collected if additional appropriations of \$240,000 were made for reconstruction during the next five years, provided repayments were reduced to \$1.44 per acre and the period of repayment extended.

6. That even with these favorable terms future collections would be met with the following obstacles:

(a) A main canal 52 miles long and 28 miles of the system being concrete or wooden structures, requiring large expenditures for operation.

(b) An irrigable area of about 8,000 acres with only 6,500 acres irrigated and cropped upon, which must bear the whole burden of project indebtedness.

(c) A porous soil with low water-holding capacity, requiring a large amount of water per acre (average for 1928 was 9 acre-feet).

(d) Poor foundation material for canals and structures, making it necessary to maintain and extend concrete-lined sections and siphons. Foundation failures are to be expected, particularly when full water supply is carried.

(e) A system which is hazardous to operate, there being constant danger of breaks which will cause serious crop losses. Without an emergency fund total crop failure may result; with an adequate fund only partial failures will occur.

(f) A question of whether the water users intend making a serious effort to pay the Government debt, this being raised by the fact that not a single water user paid his construction assessment in 1928.

7. That any agreement for the suspension or cancellation of the Government debt should (a) require a like treatment of warrant indebtedness; (b) require the district to acquire an emergency fund to care for breaks; (c) estop the district from requesting further Government appropriations.

8. If reconstruction will be sufficiently completed in the next 8 years to permit a reduction of a dollar or more per acre in the present \$5 operation and maintenance charge after that date, or if there should be an increase of 10 per cent in crop prices in the next 8 years, an 8-year postponement of construction charges and collection of construction charges thereafter would be feasible.

It is recommended that the advice of a board of engineers be secured on the engineering questions suggested in page 11 of this report.

That when such engineering report has been received that a choice be made between a cancellation or deferment of construction payments as may appear best in view of such engineering advice.

## ORCHARD MESA IRRIGATION DISTRICT, GRAND VALLEY PROJECT, COLORADO

(By Prof. Frank Adams, College of Agriculture, University of California.)

### CHRONOLOGY OF INVESTIGATION AND PROCEDURE

The field work connected with the economic investigation of Orchard Mesa Irrigation district covered the period June 21 to July 8. The first five days were spent in Denver and Fort Collins, obtaining information from the files of the Denver office of the Bureau of Reclamation and in consultation with President C. E. Lory, Director C. P. Gillette, and Profs. L. A. Moorhouse and W. G. Sackett, of the Colorado Agricultural College and Experiment Station, and with Messrs. R. L. Parshall and Carl Rohwer, of the Colorado Agricultural Experiment Station and the Division of Agricultural Engineering of the United States Department of Agriculture. The time from June 26 to July 8 was devoted to field work in the district and in Grand Junction. The preliminary survey of the district was made in company with Mr. John C. Page, superintendent of the Grand Valley project, and Mr. W. H. Olin, agricultural agent of the Denver & Rio Grande Western Railroad. Subsequently one day was spent in the district in company with each of the three members of the district board of directors, and two conferences were held in Grand Junction with the board of directors; three days were given to inspection of the district in company with Prof. L. A. Moorhouse, head of the department of economics and sociology of Colorado Agricultural College, or Superintendent Page; and the last afternoon in the field was devoted to a conference called by the board of directors

of the district and attended by Messrs. C. J. McCormick and H. O. Lambeth, of the board; Superintendent Page; William Welser, president of the Grand Valley National Bank, Grand Junction; A. C. Milne, United States Bank of Grand Junction; A. G. Tilton, vice president of the Palisade National Bank; E. T. Mathews, county commissioner; W. H. Lauck, county agent; N. W. Draper, manager at Grand Junction and Delta; and T. E. Gardner, superintendent at Grand Junction for the Holly Sugar Corporation; J. D. Reeder, prominent fruit grower and developer in the Palisade area; W. Clarence Kurtz, head of the Independent Lumber Co., Grand Junction; and F. R. Hall, real-estate operator in Grand Valley. The offices of the county treasurer and county assessor of Mesa County, were, of course, visited to obtain tax and other financial information regarding the district, and the county agent was interviewed regarding agricultural conditions and possibilities in the district. Furthermore, one day was spent with the superintendent of the district in going over its numerous problems.

**BRIEF DESCRIPTION AND HISTORY OF ORCHARD MESA IRRIGATION DISTRICT DOWN TO THE CONTRACT WITH THE UNITED STATES, FEBRUARY 18, 1922**

*Location and elevation.*—Orchard Mesa Irrigation district, sometimes referred to as a division of the Grand Valley project, covers approximately 9,600 acres south of Colorado River, extending from due south of Palisade to due south of Grand Junction. Elevations range from about 4,850 feet down to about 4,650 feet above sea level. An area of 620 acres, comprising East Palisade Irrigation district and generally referred to as the "Vineland" district, lies directly northeast of the eastern extremity of the district, and is under agreement to become a part of it as soon as the few remaining outstanding bonds of Palisade district are paid off. This area, however, is included in the 9,600 acres given as the present area of the district. As will appear later, this Palisade district area is now receiving its irrigation water supply from Orchard Mesa district and is paying the same water charge as lands within that district.

*Soils.*—No soil survey is available for Orchard Mesa district. However, the soils may be generally described as red to gray sandy loam, somewhat compacted, underlain by a cemented clay, which is locally classed as a hardpan, and by a closely cemented gravel layer. A characteristic 6-foot profile shows a considerable quantity of rounded gravel, with sufficient of this on or near the surface in some portions and of such size as to make its removal desirable. The western 5 or 6 miles of the district, which is the widest portion, varying in width from less than 1 mile to not over 2.5 miles, has flatter slopes than the remainder, and, in spite of its close proximity to the channel of Colorado River, requires drainage. Even with the drainage system that has been constructed to approximately 3,200 acres, from 1,000 to 1,500 acres are still adversely affected by high ground water, or "seeps," as this condition is locally termed.

There is ample evidence of a tight, puddled subsoil soil, the same condition holding also for much of the surface soil of this section of the district. White alkali is in evidence in the surface of a considerable area of these poorly drained soils, and crop production is low or absent. When an irrigable acreage survey of the district was made several years prior to the contract with the Government in 1922 only 153 acres of otherwise irrigable land was found which, judged from surface indications, was considered too wet or too alkaline to raise a crop, although it was anticipated that an additional area would be affected as the mesa became irrigated. Drs. W. P. Headen, chemist, and W. G. Sackett, bacteriologist, of the Colorado Agricultural College and Experiment Station, have shown in their publications that an excess of nitrates is found in many Colorado soils, including those of Grand Valley, these occurring not from concentrations in the irrigation and ground waters or from leaching of geological formations but from fixation from the atmosphere by azotobacter.<sup>\*</sup> Brown "niter spots" which characterize this condition are found within the "seeped" area, and there is a considerable growth of so-called "seep weed" present.

While the drainage ditches that have been built have, according to local reports, materially improved the adverse soil conditions just described, the

<sup>\*</sup> Bulletins 155, 179, 184, 193, and 324, Colorado Agricultural Experiment Station.

"seep" problem in the western portion of the district is sufficiently complicated to render uncertain the future agricultural value of the lands affected. Certainly the present condition of some of these lands is a definite factor in the economic situation within the district. Further references to them will be made later in this report.

*History.*—The first known survey of an irrigation project for Grand Valley was made in 1902 by G. H. Matthes. It included survey of a pumping project "to 5,000 acres of the best lands on Orchard Mesa." Prior to this, however, four small pumping systems had been constructed to the mesa, namely, the Smith Brothers, or Orchard Mesa Power Canal, near the western end of the present district; the Rose Point, or Mutual Mesa Irrigation Co., with a water fling dated in 1889, and a distribution system to 540 acres east of the Smith Brothers system; the Lee and Shore's ditch, built in 1907-8 to irrigate approximately 500 acres west of the Smith Brothers tract, this system after two years joining with the Mutual Mesa system; and the Avoca Orchard or Johnston ditch, built to supply 1,500 acres east of the Mutual Mesa tract, but abandoned after a few years of operation.

Orchard Mesa Irrigation district was organized in 1904, holding its first meeting March 18 of that year. On September 16, 1904, following failure to sell a proposed district bond issue, the district petitioned the authorities in Washington to construct a high-line canal to the district lands. Subsequently two other attempts to sell bonds failed, although later an issue of \$900,000 voted in October, 1908, and one of \$175,000 voted in October, 1909, were disposed of through the contractor for the irrigation system. The contract price on the system was \$670,000, and \$130,000 additional was paid to the promoters for water rights. Before the works were completed, however, \$1,075,000 in bonds had been disposed of, and, in addition, construction warrants amounting to \$288,000 had been issued.

The original Orchard Mesa irrigation district system is reported never to have been a success. It took over the irrigation of the areas under the smaller systems that had been previously built, utilizing the Mutual Mesa ditch as a main lateral. The district system is reported to have covered 8,366 acres, and it is further reported that up to 1921 but 3,500 acres had been cultivated. From 1910 to 1915 the annual district tax ranged from \$10.25 to \$13.75 per acre, and, beginning in 1914, there was added a water toll of \$3 per acre on each acre irrigated. It is reported that later the annual charge was even higher. The records show that in 1916, 40.8 per cent of all taxes levied were delinquent. Certainly the district was far from being in sound financial condition. The land and fruit boom which was at its height in Grand Valley when the Government began surveys for the Grand Valley reclamation project in 1908 had left a marked depression on the mesa as elsewhere in the valley. "Seep" had ruined many of the orchards on the mesa as well as in the main valley north of the Colorado. Furthermore, the district irrigation system was in bad repair and was unable to give needed service. The only alternative to complete failure for the Orchard Mesa landowners seemed to be assistance from the Government. Investigations looking to this and were begun in 1916, the district bondholders being active in efforts to induce the Government to come in. It was not until February 18, 1922, that a contract for the reconstruction by the Government of the Orchard Mesa district system, was signed by the Government, the district, and the Grand Valley Water Users' Association. At the time of this contract the outstanding overdue obligations of the district amounted to \$2,061,485.58, of which \$1,075,000 was in bonds, \$736,140 was for unpaid interest coupons, \$240,553.05 was outstanding warrants, and \$9,792.53 was for unknown items. In spite of this bankrupt condition, however, operation of the irrigation system had continued.

*The contract.*—For the purposes of this report reference need be made to only those sections of the contract of February 18, 1922, which relate directly to the financial obligations assumed by the district. These are sections 9, 15, 16, 17, 18, 19, 20, 22, 27, 28, 29, and 33. Relevant portions of these sections, briefed, are as follows:

"9. Obligates the United States to spend up to \$1,000,000 for the following purposes: (a) Construction and reconstruction of works of the district; (b) to assist the district to liquidate its indebtedness the sum of \$100,000; (c) for drainage works, not to exceed \$100,000; (d) to acquire for the district a per-

\* Data mainly from Grand Valley project history.

manent diversion and carriage right for not to exceed 400 cubic feet of water per second in connection with the Grand Valley project the sum of \$50,000; (e) for repairs and betterments of that part of the main canal of the Grand Valley project and to carry the district's water not to exceed \$50,000 if such repairs and betterments are needed during the first three years water is carried for the district; (f) reimburse the Government for expenditures made since July 1, 1918, in relation to the contract.

"15. The district agrees that the works needed to convey its water from the main canal of the Grand Valley project to the district's power house shall be constructed of sufficient capacity to carry not to exceed 400 cubic feet of water per second belonging to the Grand Valley project and held for power purposes; also to maintain said works in proper condition to carry said water at all times.

"16. In order that the contract and all obligations created thereby shall be a first lien upon all resources of the district, the district agrees to liquidate its total outstanding indebtedness, to aid which the United States will pay \$100,000 (as provided in paragraph 9, above).

"17. The district agrees to pay to the United States for the works constructed and expenditures made by the United States \$1,000,000, or so much thereof as may be actually expended under the contract, which shall be exclusive of operation and maintenance charges, penalties, and interest; said sum to be repaid in 20 annual installments, beginning December 1 of the year the completion of work or discontinuance of expenditures under the contract is announced by the Secretary of the Interior; and subsequent installments on December 1 of each year thereafter; the first 4 to be 2 per cent each, the next 2 to be 4 per cent each, and the next 14 to be 6 per cent each of the total sum of \$1,000,000.

"18. The district agrees to pay to the United States each year 28.07 per cent of the cost of operation and maintenance of the Grand Valley diversion dam, of the controlling and regulating works in connection therewith, and of the main canal of the Grand Valley project down to the point where the district's water is delivered to it at or near the eastern portal of tunnel No. 3; this sum to be due and payable March 1 of the year following the year in which such work is done or service is rendered. (From 1923 to 1928 the amounts paid to the United States under this paragraph have ranged from \$1,628 to \$3,435 per annum and have averaged \$2,134.)

"19. Provides for payment by the district of a penalty of 1 per cent per month on unpaid installments due under the contract.

"20. The district agrees to cause to be levied and collected all assessments necessary to pay to the United States all charges provided in the contract.

"22. The water to be carried by the district for the United States shall be carried at any and all times throughout the entire year when so requested by the United States.

"27. Provides that the Secretary of the Interior may exempt the district from the payment of construction or operation and maintenance charges, or both, for lands temporarily incapable of successful cultivation on account of seepage, alkaline conditions, or for any other reason, for a specified period, or until further notice, whereupon the district shall exempt from assessment such lands during the same period; or if the Secretary finds any such lands permanently incapable of successful cultivation, he may, in his discretion, contract with the district for the severance of the water rights of such lands, and for such rights becoming appurtenant to other lands within the district, or to lands which may be brought within it. It is specified that nothing in this section shall be construed to relieve the district or the landowners from responsibility for improving drainage conditions, or the district from any of its liability for reimbursement of the reclamation fund for all expenditures made under the contract.

"28. The district as a whole is obligated to pay to the United States the full amount agreed upon in the contract according to the terms stated, regardless of any individual default in the payment of any assessment levied by the district.



"29. The right is reserved to the United States to refuse to deliver water to the district in the event of default by the district for more than one year in any payment due the United States under the contract. The United States or the district shall refuse water service to lands in default for more than one year in the payment of any assessments levied under the contract.

"33. After execution of the contract the district is required to apportion the benefits under the contract against the lands of the district and prosecute a proceeding in court for a judicial confirmation of the organization of the district, the making of the contract, and the apportionment of benefits."

The above provisions of the contract under which the irrigation system of Orchard Mesa Irrigation district was reconstructed are referred to in this report because they seem necessary to show both the nature and extent of the obligation the district has assumed. The amount of the annual payments to the Government for construction and for maintenance and operation is made definite or substantially so. On the other hand, the amount involved in the obligation of the district to maintain the canal which carries both district and Grand Valley project water from the main canal of the Grand Valley project to the district power house and to carry water in that canal at any and all times when so requested by the United States (sec. 22) is not definite. It may amount to a very substantial sum, especially if the district is required to carry water through this canal throughout the winter or non-irrigation season months for power purposes, which they would be required under the contract to do in the event of the construction of a power plant to utilize the Grand Valley project share of the water.

Further reference will be made to the contract later in this report.

#### TYPES OF AGRICULTURE IN ORCHARD MESA IRRIGATION DISTRICT

Orchard Mesa Irrigation district, projected as previously indicated during the boom days in Grand Valley, was originally intended as a fruit district, and several thousand acres in the western portion was planted to apples and pears, with smaller acreages of peaches and other fruits. Now, however, all but the eastern portion, particularly all but the area east of the "Big Wash," situated about one-third of the length of the district, or about 4 miles, west of the eastern boundary, is considered essentially a general farming area. The portion east of the Big Wash is locally looked upon as best adapted to peaches and is already largely planted or in process of being planted to that crop. Some orchards have been recently planted as far as 2 miles west of the Big Wash with a few also in the western portion of the district, but always with the realization that the hazards are much greater than east of the Big Wash. Generally speaking, the areas planted to orchards during the fruit-boom period, these in the main being near or west of the "four corners"—about 5 miles southeast of Grand Junction—have been changed over to general farming, except where rendered unproductive by "seep."

The lands in Orchard Mesa district that are being devoted to general farming are by no means highly developed along that line, there being, however, a few exceptions to this statement. Alfalfa is very properly the main crop grown, with some rotation to grain and corn, and some of the fields are producing excellently. Some very good returns are being obtained from alfalfa seed. Occasionally early potatoes and sugar beets are grown, and sometimes tomatoes and other truck, but the aggregate production of these latter crops is small. The mesa is considered a satisfactory area for potatoes, also for sugar beets. Only 126 acres were in beets in 1928, the yields ranging from 7.35 to 12.43 and averaging 8.91 tons per acre. The most noticeable lack on the mesa is sufficient livestock to make well-balanced farm enterprises. This lack in itself denotes the absence of well-managed crop rotations. There is very clearly room not only for more dairy cows but also more hogs and poultry and more winter feeding of sheep and cattle, although absence of a good winter supply adversely affects winter feeding. The operator of the plant of the Western Slope Dairy Products Cooperative Association at Grand Junction reported only seven members in Orchard Mesa district, although a number of the mesa farmers sell to others, particularly the Mutual Creamery Co. in Grand Junction. The local manager of the latter company stated that there is no chance for too much dairying in Grand Valley, Los Angeles furnishing the principal market.

"It ought to be the best dairy country in the world," he stated. He estimated that the average annual production of butterfat per cow is only about 155 pounds, although a few herds are producing 300 pounds or better.

A recently organized cooperative in Grand Valley is the Inter-Mountain Poultry Producers' Cooperative Association. This association is shipping about one-half car of eggs every 10 days from February 15 to July 15 of each year, and the manager expects to ship twice as many cars during the flush season next year and within four years a car every four days during that season. The principal shipments are to New York, with less than car lots going to local merchants and to the mountain towns of the western slope. By sending out the surplus eggs the association and other shippers have maintained a good local market. Orchard Mesa irrigation district is sharing in this poultry opportunity, however, in only a small way. The manager of the association states that he is receiving only about six full cases of eggs each week from that area.

Generally speaking, the apple industry on the mesa, as in the main valley, is not prosperous, although some individuals have been obtaining good returns. To some extent frosts are held to blame; to a large extent, however, aside from market conditions, the trouble is due to the codlin moth. Climatic conditions in Grand Valley favor the development of at least two full broods of this insect pest each season, and generally a partial additional brood. According to Director C. P. Gillette, of the Colorado Agricultural Experiment Station, from 9 to 11 sprayings are required each year. More than one grower stated that frequently the apple crop does not pay for the spray materials used. Pears, on the other hand, have proven more profitable, partly because the codlin moth has been more easily controlled with them than with apples. Bartlets and Anjous are the chief varieties grown.

Some attention was given to the peach industry being developed on the mesa, particularly since this is being counted on as the main interest of the eastern portion of the district, that generally known as East Orchard Mesa. The peach growers of the Palisade area, or at least some of them, have been quite strikingly successful. The peak prices for their product and the unusually high yields of some of their orchards have materially stimulated planting on East Orchard Mesa.

Practically all of the peaches grown in the Palisade area, as well as in East Orchard Mesa, are Elbertas. The crop is handled quite largely by the United Fruit Growers Association at Palisade, but also to a considerable extent by commercial shippers and buyers. From 80 to 90 per cent of the crop is sold f. o. b. Palisade. Shipments are made as far east as Maine and New York and occasionally to Florida. Most of the product, however, is sold west of the Mississippi River, from the Dakotas to Texas. Ordinarily shipping begins about August 20 and is over within two or three weeks—sometimes by September 1, sometimes from September 5 to 10. The principal competition comes now from Illinois, with the crops of Arkansas, Washington, Ohio, New York, and New Jersey sometimes a factor. Southern peaches are said to be out of the way before shipping commences at Palisade, those from Missouri and Arkansas going off the market just ahead.

The marketing packages for the peaches are 20-pound boxes and hushel baskets, the latter equaling about 2½ boxes. About 25 cents per box covers the cost of picking, packing, packing materials, hauling to the car, and the handling charge of the association. According to the manager and the secretary of the association, the annual expense of producing an acre of peaches and putting the crop on the cars averages around \$500, this including all cultural costs and interest on the farm investment. A survey in 1925 by the United States Department of Agriculture and the department of economics and sociology of the Colorado Agricultural College placed this cost at \$447. Exceptional yields have been as high as 2,000 boxes to the acre, the same association officers estimating the average yield around 800 boxes per acre for good orchards in their prime, say, of ages 6 to 16 years.

The following data regarding shipments and prices during the years 1923 to 1928 were supplied by the secretary of the association at Palisade, these years covering the period of their operation:

**TABLE 1.—Shipments of Elberta peaches by the United Fruit Growers Association at Pallsade, Colo., 1923 to 1928**

(For 1923, figures cover all varieties)

Year	Box shipments		Bushel shipments		Total shipments, figured as as boxes
	Number of boxes	Average price to growers <sup>1</sup>	Number of bushels	Average price to growers <sup>1</sup>	
1923.....	207,036	\$0.56	136,327	\$1.37	547,853
1924.....	172,759	.80	219,209	1.20	720,776
1925.....	169,054	1.00	55,726	2.25	368,369
1926.....	292,954	.53	141,870	1.06	647,629
1927.....	447,315	.61	190,996	1.30	924,730
1928.....	169,213	.70	82,891	1.27	376,440

<sup>1</sup> F. o. b. Pallsade, after deducting charge of selling agency.

Although conditions in the Pallsade peach industry were reported by the secretary of the association as having been normal during the past eight or nine years, it is evident from the above table that the fluctuation in shipments and prices received have been considerable. Since the association shipments do not constitute all of the peaches that are produced in the Pallsade area, the relation indicated between quantity and price can not be taken to represent conditions for the entire Pallsade peach industry. However, the prices received for association peaches can be taken to represent fairly the entire Pallsade area prices. It may be noted that in three of the years—1923, 1926, and 1927—the average price received multiplied by 800, the reported average number of boxes produced by orchards in their prime, shows a return to the grower of less than the \$500 which the association officers give as the average cost per acre of producing peaches and delivering them in shipping packages to the cars in Pallsade, with association charges covered. It might be added that it was further stated by the secretary of the association that poor or bad years in the Pallsade peach industry are those in which the price is 60 cents or less per box. Obviously, however, the better-than-average orchards are profitable at the low prices given; otherwise the average bearing Elberta peach orchard in the Pallsade area would not sell for \$1,000 per acre, which is the local estimate of peach-land prices. The range in selling prices given by an experienced grower was \$500 to \$1,600 per acre. The same grower, who develops orchards for sale, owns a 7-year old Elberta peach orchard, with no improvements other than fencing, which he states is not on the market for \$2,000 per acre.

#### ECONOMIC STATUS OF FARMERS IN ORCHARD MESA IRRIGATION DISTRICT

Sixteen farms in Orchard Mesa irrigation district were covered by the standard questionnaire prepared for the inquiry, and three by Prof. L. A. Moorhouse, head of the department of economics and sociology of the Colorado Agricultural College, using the farm-management schedule of his department. Three of the farms covered by the standard questionnaire were not comparable with the group. The data for the other 16 of the 19 visited are presented in Table 2 below. None of the developed peach orchards of the East Orchard Mesa are included, but data for a few of them are presented in a later table.

TABLE 2.—Summary of statistical data relating to capital at settlement, investment, gross income, taxes, and indebtedness for 16 farms in Orchard Mesa Irrigation District, Grand Valley project, Colorado, 1928

Farm No.	Acre, acres	Amount of capital at settlement		Purchase price of land, per acre		Estimated cost of farm buildings		Estimated cost of machinery and equipment		Years on this farm, 1928	Gross income from products sold, 1928		Principal source of farm income, 1928	Other income, 1928	State, county, and school district taxes, 1928	Irrigation district taxes and interest on Government construction charge and delinquent taxes, if any, 1928		Present indebtedness exclusive of Government construction charge and delinquent taxes, if any, 1928
		Cash	Stock, equipment, and other	From	To	Present	Additional improvements needed	Present	Additional needed, including live stock		Total	Average per acre for area irrigated, 1928				Total	As per cent of gross income, 1928	
1	14½	\$400	None.	---	---	\$400	\$900	\$1,350	\$350	10	\$928	\$968	Peaches, apples	\$650	\$90	\$72	7.4	\$0,000
2	20	575	\$900	25	50	800	650	500	335	10	831	1,081	Dairy products, truck	300	55	105	9.7	500
3	34	8,000	None.	20	75	1,780	None.	860	None.	10	1,282	377	Peaches	668	183	201	( <sup>1</sup> )	6,000
4	220	5,000	10,000	10	200	7,550	1,750	3,900	None.	20	11,000	9,665	Alfalfa seed, truck, beets	500	375	1,035	10.7	6,000
5	80	850	200	26	75	2,000	500	870	800	7	2,691	2,071	Truck, beets	None.	102	402	19.4	4,800
6	41	None.	1,100	---	---	( <sup>2</sup> )	2,500	530	2,000	6	1,251	1,610	Poultry, alfalfa hay, dairy products, bay	100	104	211	13.1	8,800
7	131	1,000	600	5	100	2,600	300	2,100	None.	11	6,027	5,267	Alfalfa seed, truck, poultry, beets	None.	196	585	11.1	500
8	21	700	1,500	30	180	1,200	500	700	600	9	1,175	1,250	Fruit, dairy products	None.	97	111	8.8	500
9	40	600	21,000	---	---	2,800	None.	3,000	None.	10	1,055	2,067	Dairy products, hogs	1,000	86	210	10.0	None.
10	40	2,200	None.	5	250	70	( <sup>3</sup> )	( <sup>3</sup> )	( <sup>3</sup> )	4	538	1,129	Beets, poultry	800	44	173	13.3	1,850
11	49	( <sup>4</sup> )	None.	60	500	( <sup>4</sup> )	3,750	3,900	400	18	2,268	2,198	Pears, alfalfa seed, poultry	800	109	233	11.7	4,800
12	25	3,000	None.	50	110	1,380	100	1,100	None.	15	354	636	Dairy products	None.	67	123	19.3	None.
13	10	None.	375	( <sup>5</sup> )	( <sup>5</sup> )	480	150	1,425	80	12	1,140	674	Poultry	350	37	52	7.7	500
14	10	( <sup>6</sup> )	( <sup>6</sup> )	23	220	2,400	( <sup>6</sup> )	1,425	( <sup>6</sup> )	12	2,203	2,203	Alfalfa hay and seed	None.	53	52	2.3	( <sup>7</sup> )
15	120	( <sup>6</sup> )	( <sup>6</sup> )	---	---	775	( <sup>6</sup> )	663	( <sup>6</sup> )	13	4,953	3,698	Alfalfa products, poultry, hogs	( <sup>7</sup> )	177	628	15.7	( <sup>7</sup> )
16	20	( <sup>1</sup> )	( <sup>1</sup> )	---	---	800	( <sup>1</sup> )	300	( <sup>1</sup> )	17	960	967	Truck, poultry products, hogs	( <sup>1</sup> )	69	105	11.0	2,500

<sup>1</sup> Mostly young orchard.<sup>2</sup> All or mostly included in purchase price.<sup>3</sup> Indefinite.<sup>4</sup> As needed.<sup>5</sup> Homesteaded; worked out while developing farm.<sup>6</sup> Very little.<sup>7</sup> Made up partly from agricultural college schedule, which did not cover this item.

It will be noted from the column headed "Years on this farm" that most of the farms visited have been occupied by their present owners for 10 years or more. Only three were purchased since the date of the contract with the Government for reconstruction of the district irrigation system. Since the farms visited are typical of the district, or at least typical of the better holdings, it is clear that they are hardly comparable with the new settlements found on many Government projects. In some cases the prices paid for land were excessive, and based on boom conditions of a number of years ago; in other cases the average price paid is made low by the fact that part of the land was bought at district-tax sale for a nominal figure, in some instances just enough to cover the delinquent taxes for the Government construction charge.

The columns showing the amount of capital at settlement, the total gross income, the average gross income per acre for the area irrigated in 1928, and the irrigation-district taxes and water tolls, are the most significant in this table.

Four of the thirteen settlers had as much as \$3,000 in cash or other assets; for five the combined cash and other assets amounted to less than \$1,500 each. With the exception of the three cases in which the amount owned was \$8,000 or more, lack of needed capital at settlement was always evident. It was, in fact, in most cases, a governing cause of low gross income. Other very evident causes were either a poor soil condition, undersized farm enterprise, or lack of livestock, in some cases all of these being present on a single farm.

Considering the total gross income, it is found that in only 7 of the 16 cases listed did it exceed \$2,000 for the year; in 5 it was under \$1,000.

There is no definite basis for fixing a minimum gross income that will enable the farm family to live in decent comfort and still meet necessary operating expenses and necessary payments on the farm investment, or the purchase of needed livestock and equipment. That minimum, for Orchard Mesa district, however, certainly can not go below \$1,500, and probably is nearer \$3,000. But half of the 16 cases show a gross income of as much as \$1,500; for only three did it exceed \$3,000. The usual general farm on Orchard Mesa is too small, too greatly undercapitalized, and too little diversified with livestock to constitute a satisfactory economic enterprise.

The column showing the annual irrigation district taxes and water tolls paid expressed as a percentage of the gross income from crop on products sold indicates very clearly that irrigation water costs are a heavy burden. Again, there is no fixed rule as to permissible irrigation costs. To pay out one-tenth of a gross income of \$1,000, or 10 per cent of a gross income of \$2,000, for irrigation water is obviously more than is justified. Either the irrigation charges should be less or the gross income should be more. It is not surprising that most of the farmers visited felt that the irrigation taxes should be reduced. The investigator, however, found no pronounced sentiment for doing the things necessary to increase gross income. This does not mean that the farmers were unmindful of those things; it rather indicates that they are more conscious of their difficulties than of the possible methods of overcoming them. Taxes are about the last thing paid each year with many of the farmers, and at that time the money of the year is about gone; it is not surprising that they should be looked upon as the main cause of trouble, even if they are only one of several causes.

#### COMPARISON WITH CONDITIONS IN GRAND VALLEY NORTH OF COLORADO RIVER

During the seasons of 1926, 1927, and 1928 the department of economics and sociology and the agricultural extension service of the Colorado Agricultural College, cooperating with the Division of Farm Management and Costs of the United States Department of Agriculture, obtained farm enterprise schedules from about 30 farmers in Grand Valley, all living north of Colorado River. Through the kindness of Prof. L. A. Moorhouse, copies of these schedules for 1926 and 1927 were made available as comparative data in the Orchard Mesa irrigation district survey. To the extent covered, information similar to that called for in the standard schedule used in present inquiry is summarized below for the first 25 farms:

TABLE 3.—*Statistical data relating to farm income, taxes, and water charges, for 25 farms in Grand Valley, Colo., elsewhere than in Orchard Mesa irrigation district, 1926 and 1927*

[Information taken from schedules obtained in field by department of economics and sociology and agricultural extension service, Colorado Agricultural College, cooperating with Division of Farm Management and Costs, United States Department of Agriculture]

Farm No.	Area in crop, acres	Purchase price of land, including improvements, if any, per acre	Gross income from products sold			Principal source of farm income	Other income	Taxes	Annual cost of irrigation water, including drainage	
			Year	Amount	Per acre				Total	As per cent of gross income
1.....	16	\$204	1926	\$6,604	\$412	Fruit (roadside market).....	\$406	\$180	\$28	0.4
2.....	26	285	1926	4,105	158	Fruit, truck.....	500	215	108	3.0
	27		1927	8,346	309	do.....	150	( <sup>1</sup> )	( <sup>1</sup> )	( <sup>1</sup> )
3.....	12	300	1926	1,675	139	Fruit.....	100	35	50	3.0
	10		1927	1,713	171	do.....		105	50	2.9
4.....	20	160	1926	1,783	89	Truck, fruit.....	100	162	105	5.9
			1927	1,500	75	do.....	100	( <sup>1</sup> )	( <sup>1</sup> )	( <sup>1</sup> )
5.....	20	317	1926	2,331	116	Fruit.....	( <sup>2</sup> )	182	15	.7
			1927	3,870	193	do.....	( <sup>2</sup> )	171	15	.4
6.....	24	Gift.	1926	1,459	59	do.....	150	140	9	.6
	39		1927	3,850	98	do.....		140	9	.2
7.....	48	450	1926	4,726	98	do.....		550	45	.9
8.....	36	170	1926	739	20	Fruit, dairy products.....	200	342	27	3.6
			1927	1,871	52	do.....	550	294	86	4.6
9.....	7	437	1926	813	116	Truck (roadside market).....	300	96	( <sup>2</sup> )	( <sup>2</sup> )
			1927	1,060	151	do.....		90	( <sup>2</sup> )	( <sup>2</sup> )
10.....	12	( <sup>3</sup> )	1926	1,577	131	Fruit.....	2,080	30	( <sup>2</sup> )	( <sup>2</sup> )
11.....	24	180	1926	7,276	214	do.....		176	438	5.7
			1927	6,211	182	do.....		( <sup>1</sup> )	( <sup>1</sup> )	( <sup>1</sup> )
12.....	13	555	1926	1,367	105	do.....		156	26	1.4
			1927	2,500	192	do.....	( <sup>2</sup> )	149	18	.7
13.....	64	( <sup>3</sup> )	1926	3,923	61	Fruit, alfalfa, dairy products.....	1,920	331	81	2.0
			1927	3,739	58	Fruit, alfalfa, truck.....	1,190	252	81	2.1
14.....	51	( <sup>3</sup> )	1926	1,420	28	Dairy products, fruit.....	26	218	45	3.2
	65	( <sup>3</sup> )	1927	2,072	32	Dairy products, alfalfa.....	25	228	27	1.3
15.....	25	200	1926	1,408	56	Fruit, truck.....	80	76	54	3.6
	38		1927	626	16	Truck, fruit, dairy products.....	95	( <sup>2</sup> )	( <sup>2</sup> )	( <sup>2</sup> )
16.....	23	116	1926	2,523	110	Fruit.....		202	38	1.5
			1927	9,846	428	do.....	60	205	( <sup>2</sup> )	( <sup>2</sup> )
17.....	13	650	1926	2,300	170	do.....	990	135	( <sup>2</sup> )	( <sup>2</sup> )
18.....	37	500	1926	4,549	123	Fruit, livestock products, livestock.....	450	304	87	1.9
	27		1927	3,125	115	Fruit, livestock products, garden.....		330	16	.5
19.....	30	112	1926	2,935	98	Fruit.....		186	9	.3
20.....	20	17	1926	925	46	do.....	75	16	28	3.0
21.....	17	147	1926	1,546	91	Livestock products, honey.....	132	180	( <sup>2</sup> )	( <sup>2</sup> )
	23		1927	1,699	74	do.....	( <sup>2</sup> )	( <sup>2</sup> )	( <sup>2</sup> )	( <sup>2</sup> )
22.....	103	125	1926	2,614	25	Market milk.....	200	94	18	.7
23.....	11	666	1926	3,167	288	Fruit.....		196	13	.4
24.....	17	277	1926	749	44	do.....	450	( <sup>2</sup> )	( <sup>2</sup> )	( <sup>2</sup> )
25.....	20	150	1926	1,847	92	Fruit, truck.....	100	271	97	5.2
			1927	905	45	Fruit, truck, livestock products.....	50	( <sup>2</sup> )	( <sup>2</sup> )	( <sup>2</sup> )
26.....	10	300	1926	2,310	231	Fruit, hogs, poultry.....		150	( <sup>2</sup> )	( <sup>2</sup> )
				3,109	311	Fruit, poultry.....		150	( <sup>2</sup> )	( <sup>2</sup> )

<sup>1</sup> Not segregated.<sup>2</sup> Hires all farm work done.<sup>3</sup> Not available.

The capital at settlement was not called for in the schedule used, so it is not included in the above tabulation. The gross income from products sold and the amount of taxes and irrigation costs are shown. Of 43 yearly gross incomes, 6 are under \$1,000, 5 between \$1,000 and \$1,500, 10 between \$1,500 and \$2,000, 7 between \$2,000 and \$3,000, and 15 above \$3,000, one-third of the latter going above \$5,000. This is a much better showing than made for Orchard Mesa district. In explanation of this difference, however, it should be stated

that in selecting the farms for their inquiry, the college and department of agriculture workers sought to pick out those that were known to be successful. Those selected for the Orchard Mesa study, however, while including some of the most successful, also covered some who are much less successful. It should also be noted that fruit entered much more largely into the returns on the north-side farms than on Orchard Mesa, notwithstanding the fact that general farming is supplanting fruit in all portions of Grand Valley except the eastern portion.

Comparing the annual irrigation charges for the north-side farms with those on Orchard Mesa shows the situation of the former to be much the better. The maximum on the north side, expressed as a percentage of the gross income, is 5.9. In 11 of the 28 cases the percentage is less than 1. The reason for the low charges is partly that most of the farms are under the old Grand Valley canal system which has unusually low costs. The higher gross income, however, is the main factor in the situation.

## COMPARISON WITH THE PALISADE FRUIT AREA

Neither of the two tabulations above includes orchards in the Palisade area. Below are tabulated the returns from 10 farms in the latter area for 1927, based on schedules obtained by the college of agriculture and the United States Department of Agriculture. It will be noted that in half the cases the income exceeded \$5,000, and that in only two it fell below \$2,000. In only two cases did the irrigation charge exceed 2 per cent of the gross income. This fact will be referred to later in discussing the readjustment of the annual assessment rates in Orchard Mesa district.

TABLE 4.—*Gross income, taxes, and cost of irrigation water for 10 orchards in Palisade area, Grand Valley, Colo., 1927*

[Information taken from schedules obtained in field by department of economics and sociology and the agricultural extension service, Colorado Agricultural College, cooperating with Division of Farm Management and Costs, United States Department of Agriculture]

Farm No.	Area in crop, acres	Gross income from products sold		Principal source of income	Taxes	Annual cost of water for irrigation	
		Total	Per acre			Total	As per cent of gross income
2.....	14	\$9,230	\$659	Peaches.....	\$627	\$48	0.5
3.....	9	5,794	644	Peaches, apricots.....	175	45	.8
5.....	19	11,316	595	Peaches.....	( <sup>1</sup> )	( <sup>1</sup> )	( <sup>1</sup> )
6.....	15½	9,608	619	Apples.....	240	65	.6
8.....	22	5,295	241	Peaches.....	220	94	1.8
9.....	4	3,644	911	Peaches, apricots.....	155	22	.6
10.....	18	3,617	201	Peaches.....	380	( <sup>2</sup> )	( <sup>2</sup> )
11.....	8	1,910	239	do.....	95	53	2.3
13.....	12	3,995	333	do.....	215	( <sup>2</sup> )	( <sup>2</sup> )
14.....	14	1,340	96	Pears, peaches.....	156	81	6.0

<sup>1</sup> Not segregated; total tax, general, irrigation, \$562.

<sup>2</sup> Including 3 acres grazing land.

<sup>3</sup> Not available.

<sup>4</sup> 7 acres alfalfa, 5 acres bearing orchard, 2 acres nonbearing orchard



# 170 ECONOMIC SURVEY OF CERTAIN IRRIGATION PROJECTS

At this point it is appropriate to include a comparative statement of irrigation charges throughout Grand Valley as furnished by Supt. John C. Page, of the Grand Valley project, these covering the year 1929:

<b>Palisade irrigation district:</b> <sup>a</sup>	Per acre
Maintenance and operation-----	\$1.98
Interest on bonds-----	.10
Redemption of bonds-----	2.42
	<hr/> 4.45
Payment to the United States out of the maintenance and operation fund based on \$1 per acre. <sup>b</sup> All bonds to retire in 1930.	
<b>Mesa County Irrigation district:</b> <sup>c</sup>	
Maintenance and operation-----	2.28
Toll-----	4.00
	<hr/> 6.28
Payment to the United States based on \$2 per acre. <sup>a</sup> A levy of \$55.43 per acre was made in 1927, collectible in 1928, to retire all outstanding bonds and interest coupons and pay the cost of dissolving the district, and all bonds but \$11,500 were taken up. Most of the bonds were used in paying back taxes or exchanged for tax certificates.	
<b>Redlands Irrigation Co. (private):</b>	
Maintenance and operation-----	4.00
Water-right payments were included in the price of land and call for the delivery of $\frac{1}{2}$ inch per acre.	
<b>Grand Valley Irrigation Co.:</b> <sup>d</sup>	
Assessments are made on shares of stock, which are not appurtenant to the land, the number of shares per acre not being uniform. For a normal water right of $\frac{1}{2}$ inch per acre the annual payments range from-----	
	\$0.90-1.00
<b>Grand Valley project (Government):</b>	
Minimum levy per acre by Grand Valley Water Users Association for operation and maintenance, with allowance of 2.5 acre feet-----	1.75
Average excess water on productive land, 1 acre-foot, at \$1-----	1.00
Construction charge levy-----	.55
	<hr/> 3.30
<b>East Palisade irrigation district:</b>	
Maintenance and operation-----	.95
Total (paid to Orchard Mesa irrigation district)-----	5.75
	<hr/> 6.70
Palisades drainage district covers the same area as East Palisade irrigation district. Its assessments for 1929 is \$4.25 per acre, made up as follows: Bond redemption, \$1.75; bond interest, \$1; maintenance and operation, \$1.50. Adding this charge to the irrigation charge makes a total of \$10.95 per acre.	
<b>Orchard Mesa irrigation district:</b>	
Maintenance and operation-----	1.35
United States construction charge-----	2.40
Drainage construction fund-----	.50
Toll per acre irrigated-----	1.50
	<hr/> 5.75

<sup>a</sup> There is an additional drainage charge levied by Grand Junction drainage district amounting in 1929 to 2 mills, or from \$0.14 to \$0.25 per acre. The district embraces all of Palisade and Mesa County irrigation districts and all land under the Grand Valley Irrigation Co. canal, including the city of Grand Junction.

<sup>b</sup> The Government supplies water to Palisade and Mesa County irrigation districts from the Grand Valley main canal—to the former by gravity through the Price ditch, and to the latter by pumping into Stub ditch by means of a power turbine pump operated by the gravity water delivered to Palisade district, the power head being 17 feet and the lift from the main canal 31 feet.

## PRESENT FINANCIAL STATUS OF ORCHARD MESA IRRIGATION DISTRICT

According to the contract of February 18, 1922, and the notice from the Secretary of the Interior, Orchard Mesa irrigation district is obligated to pay to the United States a total construction charge of \$999,768, in 20 annual installments carrying from 2 to 6 per cent. For each of the first four years beginning December 1, 1927, the rate is 2 per cent, or \$19,995.36. The first installment has been paid. On July 5, 1929, the account of the district for subsequent years, as shown by the books of the Grand Valley project at Grand Junction, stood as follows:

Construction charges due Dec. 1, 1928.....	\$19,995.36
Paid on account.....	8,906.36
Balance due on principal.....	11,089.00
Penalties paid to date.....	1,033.50
Balance of 1920 levy on hand with county treasurer.....	6,267.09

The district has not been able to collect its taxes in full, this accounting for the delinquency on the construction charge noted above. Total district tax delinquencies, however, greatly exceed that amount, these being as of December 31, 1928, which is the latest date for which figures were available in the office of the county treasurer of Mesa County, as follows, the figure not going back of the contract of February 18, 1922:

Maintenance and operation:		
1922.....	\$1,335.45	
1923.....	1,631.81	
1924.....	1,709.17	
1925.....	6,172.04	
1926.....	4,134.98	
1927.....	4,255.24	
		\$19,239.20
United States construction charge:		
1926.....	5,512.95	
1927.....	7,564.92	
		13,077.87
East Fallsade pipe line account, 1925.....		1,389.26
Bonds and interest on bonds:		
1922.....	\$526.26	
1923.....	626.20	
1924.....	285.39	
		1,437.85
		35,144.27

On June 30, 1929, the district had to its credit with the county treasurer the following amounts:

Maintenance and operation.....	\$3,585.32
United States construction, 1929.....	6,267.09
Drainage, 1929.....	1,096.13
Construction, 1925.....	50.58
	10,999.12

## STATISTICAL DATA REGARDING ORCHARD MESA DISTRICT

Certain statistical data regarding Orchard Mesa irrigation district were requested of the board of directors. Up to the time of completing this report, however, it had not been received. It will therefore be filed later as an appendix.

## ABILITY OF LAND OWNERS TO MEET PRESENT CONTRACT WITH THE GOVERNMENT

The data previously presented relating to the financial affairs of Orchard Mesa irrigation district indicate that the present income is not sufficient to enable the district to meet its obligations under the existing contract. The question arises, is it reasonable to expect an increased income and, if so, how is this to be obtained?

The writer of this report believes that there are four main reasons for the present unsatisfactory condition, viz:

(1) Low gross income per farm and per acre, due chiefly to lack of adequate livestock and well-balanced farm programs, these in turn being due very largely to inadequate farm capital.

(2) Poor soil conditions in the "seeped" areas.

(3) Idle land.

(4) Inequitable method of irrigation district assessments.

The above factors in the situation will be discussed separately.

*Low gross income and inadequate capital.*—There is no question that better farming programs, based largely on more livestock, principally dairy cows and poultry, would materially increase farm income in Orchard Mesa district. The local banks are ready to finance the purchase of more livestock up to a reasonable limit if borrowers have the assets to warrant making the loans. The difficulty is that many of the farmers do not have the necessary assets. Few of the farms are satisfactorily improved and credit is not available for further improving them, largely because money can not be borrowed on the land on account of the prior Government lien for its construction charge. There are quite a number of renters. Furthermore, there are some on the mesa—estimates would vary as to the percentage—who can not be classed as "good farmers." The percentage of these certainly is sufficiently high to be a factor in the situation. As to livestock, one competent local observer stated that Orchard Mesa farmers are not sufficiently "livestock minded."

Opinions naturally differ as to the amount of capital a settler on Orchard Mesa should have to give reasonable promise of success, assuming, of course, a properly qualified settler. A majority of the water users interviewed placed the amount between \$2,000 and \$4,000 for a 40-acre general farm. One said \$2,500 to \$5,000, one \$4,000 and equipment, one who has been largely raising fruit, \$10,000. One banker estimated the requirement at \$7,500; another at \$5,000, or, say, \$1,000 per year for three years in addition to cost of land, buildings, and equipment; a third at \$8,000 to \$10,000.

Suggestions were sought from a number of water users and others, including the board of directors of Orchard Mesa district, with reference to the detail of the capital requirements of new settlers; that is, the resources necessary for the purchase, equipment, and development to a self-sustaining condition of a 40-acre general farm. The result is presented in Table 5, which estimates total requirements and the amount needed during each of the first three years. Only an initial payment of 25 per cent of the cost of the land is included. The figures are intended to set forth average needs, recognizing the fact that the exceptional man can do with less and that some would fail with more. If the estimates given are sound, it will be seen that the bankers interviewed are much more nearly right than the water users. That the farmers on Orchard Mesa are far short of capital requirements has already been shown by columns 2 and 3 in Table 2. Since capital for needed improvements is not available either locally or through outside agencies, the only present alternative seems to be to get new settlers with more capital, but the likelihood of being able to do this is not promising.

TABLE 5.—*Estimated necessary expenses during the initial 3-year period in the purchase, equipment, and establishment of a 40-acre general farm in Orchard Mesa irrigation district, Grand Valley, Colo.*

Initial payment on 40 acres at \$50 per acre.....	\$500
Interest on unpaid principal at 6 per cent, 3 years.....	270
Dwelling.....	1,000
Barns, sheds, chicken house, etc.....	800
Fencing.....	200
Water cistern.....	125
Farm machinery and equipment:	
Mower, \$100; rake, \$65; disc harrow, \$45; walking plow, \$25; hay	
stacker, \$100; two cultivators, \$75; cream separator, \$75; wagon,	
\$125; team and harness, \$225; automobile, \$650; harrow, \$30; mis-	
cellaneous, \$85; total.....	1,600
Household equipment.....	200
Six cows.....	750
Pigs.....	25
Poultry.....	150
State, county, and school district taxes, 3 years.....	210

**Farm machinery and equipment—Continued.**

Irrigation district taxes (1929 rate).....	\$510
Water tolls for area irrigated (1929 rate).....	135
Family living.....	1,500
Feed for stock first year.....	200
Seed.....	150
Operation automobile (\$10 per month).....	360
Incidentals.....	300
	<hr/>
	8,985

**Portion of above required the first year:**

Payment on land.....	500
Interest on unpaid principal.....	90
Part of dwelling.....	500
Barn, sheds, etc.....	400
Fencing.....	175
Water cistern.....	125
Half of farm machinery and equipment.....	800
Household equipment.....	200
One cow.....	125
Pigs.....	25
Poultry.....	35
Seed.....	100
Feed.....	200
State and county taxes.....	70
Irrigation district taxes.....	170
Water tolls, 20 acres.....	30
Living expenses.....	500
Operating automobile.....	120
Incidentals.....	100
	<hr/>
	4,265

**Portion required the second year:**

Interest on unpaid principal.....	90
Add to dwelling.....	250
Add to other buildings.....	200
Add to fencing.....	25
Add to farm machinery and equipment.....	300
Two cows.....	250
Poultry.....	50
Seed.....	50
State and county taxes.....	70
Irrigation district taxes.....	170
Water tolls, 30 acres.....	45
Living expenses.....	500
Operation automobile.....	120
Incidentals.....	100
	<hr/>
	2,220

**Portion required the third year:**

Interest on unpaid principal.....	90
Add to dwelling.....	250
Add to other buildings.....	200
Add to farm machinery and equipment.....	500
3 cows.....	375
Poultry.....	65
State and county taxes.....	70
Irrigation district taxes.....	170
Water tolls, 40 acres.....	60
Living expenses.....	500
Operation automobile.....	120
Incidentals.....	100
	<hr/>
	2,500

Methods of increasing farm income in Orchard Mesa district obviously must quite largely be those needed in other sections of Grand Valley, or generally for the Western Slope of Colorado. The College of Agriculture and United States Department of Agriculture, through the agricultural extension service, have laid out a constructive program of work, which County Agent Lauck is seeking to have carried out. Improvement of field crops, soil improvement, and various phases of stimulating and bettering the livestock industry and poultry raising occupy a prominent part of this program. In December, 1928, very definite recommendations were made at a Western Slope extension conference at Grand Junction. Among these only a few will be quoted, these seeming especially applicable to Orchard Mesa:

That there be an increase in dairying on the Western Slope.

That no cows be kept for dairy purposes which produce less than 250 pounds per year.

That more pastures be supplied for dairy cattle.

That every general farm on the Western Slope raise a few litters of hogs.

That farmers on the Western Slope produce enough feed without having to ship feed in.

That a steady increase in the number of head of poultry to 200 to 250 birds per farm be made.

That all unprofitable fruit trees, regardless of variety, be pulled and destroyed.

That in sections where seed can be produced successfully, the acreage of alfalfa, sweet clover, and red clover be enlarged to fit into the crop rotation.

That there be a more conservative use of irrigation water.

That each farmer plant a variety of crops and raise such livestock as he can feed and care for adequately.

That every farmer arrange his production either of crops or livestock so that he will have financial returns from some source monthly, or at least three or four times each year.

The writer feels no hesitancy in stating that such an agricultural program as has been recommended by the Agricultural Extension Service, and which is but briefly and only in part referred to above, would materially lessen the burden of irrigation assessments in the Orchard Mesa area.

Another point with reference to the size of farm income, already mentioned, should be further emphasized, viz, the many undersized farms. It will be recalled that half of the 16 farms covered by the standard questionnaire (Table 2) were under 40 acres in area and that five were of 20 acres or under. There seems little question that under the conditions of Orchard Mesa, excepting in the eastern fruit area and poultry farms and truck, 40 acres is a minimum satisfactory unit. Of 11 water users who answered the question as to what is the most suitable size of farm for the average farmer adequately financed, 9 answered 40 acres. One preferred 50 to 60 acres, one stated that 40 acres is sufficient for a living but would yield no profit, and one believed he should have 80 acres. For fruit, 10 to 15 acres was recommended. The writer believes that the number of farms above 40 acres will increase as more capital is accumulated or made available.

*Poor soil conditions.*—What can be done to improve these, other than continuing and extending drainage and making the drainage system more effective, is problematical. The situation needs expert consideration on the soil and plant side. The College of Agriculture has made no soil studies specifically applied to the mesa, but results of studies in progress elsewhere, as in Arkansas Valley with reference to silt conditions, should be applicable. The future of the "seeped" soils of the mesa, and others that may become "seeped," can not be forecast in this report.

*Idle lands.*—No definite information is available as to the extent of idle lands. The secretary of the district estimates that from 6,200 to 6,500 acres are paying the entire tax levy. Some of the farmed lands, however, are not paying. It is said that about 200 acres are being irrigated without even paying water tolls, which is collectible in advance at the rate of \$1.50 per acre irrigated. Of an estimated 3,200 acres reached by district drains, about 750 acres has never been planted, and, including this, about 1,000 acres are not being farmed. The largest area of idle land is west of the "Big Wash" and east of the "Four Corners." (Fig. 9.) Taking the area that is paying water tolls (not irrigation-district assessments, viz, about 5,800 to 6,000 acres, as the farmed area, leaves 3,500 acres to 3,700 acres which are idle. This is on the basis

of a total area in the district of 9,560, including East Pallsade irrigation district, which is not yet legally included, although paying full water tolls and assessments to the extent of 560 acres. Some of the idle land is stated to be as good as the best in the district, but much is of less value, and much, as already indicated, is in poor condition because of "seep."

There has been a substantial increase in the farmed area in the district since reconstruction of the system was taken over by the United States—from about 2,500 acres in 1922 to about 6,000 acres in 1929, the areas under cultivation for each year being approximately as follows:

Year	Acres	Year	Acres
1922-----	2,500	1926-----	5,252
1923-----	3,000	1927-----	5,534
1924-----	3,700	1928-----	5,843
1925-----	4,500	1929 (estimated)-----	6,000

There is no settlement problem in the district east of the "Big Wash," although there is still some unimproved land there. In the area extending from about 2 miles west of the "Big Wash" east to Pallsade, 23 new holdings, aggregating 210 acres and ranging from 1 to 30 acres, were developed in 1928, and 14, totaling 73.5 acres, ranging from 1 to 8 acres, were developed in 1929. Westerly from this area, however, practically no new holdings are coming in, although there is some extension of existing farms by purchase, and some lands previously farmed but abandoned are again being cultivated, or at least in the case of some, attempts in that direction are being made.

A rather clear idea of the difficulties connected with reestablishing some of the "seeped" areas after drainage is presented by 80 acres, constituting part of sec. 27, T. 1 S. R. 1 E., acquired in 1918 at tax sale for \$600. This land showed considerable "seep." No drains were yet in.

The first year the land was farmed by a renter who attempted to raise sugar beets but failed, the owner receiving but \$60 for his third of the crop. The land then remained idle until the fall of 1925, when it was again rented, the owner to pay taxes, water tolls, furnish the seed, and pay for plowing. After spending \$150 the owner canceled the contract because dissatisfied with the tenant. Again the land remained idle, this time up to 1928. The owner then paid up back taxes, which he had allowed to go delinquent, to and including the 1925 tax. The taxes had amounted to about \$300 per year to 1922 and about \$400 per year after that.

In the fall of 1927, the land was sold for \$3,000, the seller to pay delinquent taxes for 1928. A note for \$800 was taken as a down payment, to be paid in one year with interest at 8 per cent, the balance to be paid over five years with interest at 6 per cent. The buyer put in about 25 acres of sugar beets, but felt justified in taking care of only 10 acres, from which about \$800 was received.

Instead of demanding payment on the \$800 note, the seller renewed it, with unpaid interest added to the principal. In 1929 the purchaser has 25 to 30 acres in sugar beets, a little in tomatoes, and wheat, and is pasturing the remainder. The purchaser has paid no taxes and the property is therefore within six months of sale for taxes. The seller now has spent on the 80 acres about \$3,400, and taxes due are estimated at \$1,300. If the purchaser throws up at the end of 1929 the seller will be behind interest on his investment, taxes, and tax penalties, and ahead some improvement in the land. The land is spotted and shows some niter coloring. Beets constitute almost the only crop the soil will raise in its present condition. A district drain was put in about 1924.

The difficulties just described, while typical of those that would be encountered on much of the "seeped" land, are, of course, greater than on the better idle land of the district. A substantial area of the latter is available at tax sale, through tax delinquency exceeding three years. A member of the board of directors estimated that at least two-thirds of the development of the past five years has been on land purchased at tax sale. A tax service corporation has between 700 and 1,000 acres which it purchased in 1925 at tax sale, as an investment or speculation. The directors of the irrigation district report that the company is offering part of the area for the taxes they have in it; that is, from about \$25 to \$40 per acre. In some cases disposal of land at

<sup>7</sup> 5,863 acres to July 8, 1929; more expected.

tax sale is made difficult by the uncertainties as to title and the resulting expense of clearing title.

An effort was made to learn the area of land the district has taken over by tax deeds, but no tabulation of this had been prepared. The district has established the policy of selling tax certificates on improved farm units at their face value and on "seeped" land at from \$5 per acre, which approximates the total levy for Government construction charge prior to the 1920 levy, to 50 per cent of face value. Both the district and the county have authority under the law to make such disposal of back taxes as they may deem best, and the statement was made that bona fide purchasers have no difficulty in obtainable reasonable adjustment.

Learning that several parties have purchased land at tax sale with the idea of establishing it in crop and then selling it, one of these was interviewed. He has been doing this for the past 13 years, purchasing in all about 500 acres. The cost of the land has been \$7 or \$8 per acre. He reported that leveling, ditching, fencing, planting, and caring for the improved places has cost from \$40 to \$60 per acre. Where all work has been hired done, the contract price has been 25 per acre, the owner paying for the seed and fencing and paying the taxes. The land so improved has been sold at various prices—some at \$100 per acre, some at \$75, some at \$20, on which he came out about even, some as low as \$10 or \$15, which represented a loss. Sales have been made partly for cash, partly on 3 or four years' time, partly on 6 to 10 years. In some cases payments have been made monthly. Interest on deferred payments has been 7 and 8 per cent. This operator stated that those to whom he has sold land are paying out. The tracts are usually small and many of the purchasers are working out or have coal mines.

From inquiries made it was hoped that a plan could be developed by which local capital could be induced to furnish a revolving fund, beginning in a small way with 10,000 to \$20,000, for use in putting idle land into crop, with no other improvements but fencing, the idea being that the district and the county would waive back taxes and permit the land to be sold at cost of establishing it, which would be not over \$40 to \$60 per acre. In a conference of prominent men in Grand Valley, it was the unanimous opinion that such a plan would not work, because sufficient land could not be sold for cash, or on short time, even at \$40 to \$50 per acre, to make the fund revolve.

From what is stated above, it is evident that the idle land, particularly the "seeped" land, constitutes a major part of the financial problem of the district. Apparently, for the present at least, purchasers of land for development must come largely from the local or near-by communities. Apparently, also, the district and local landowners must bear the main responsibility in obtaining buyers. It is believed that county and district authorities should be willing to waive all outstanding tax delinquencies if this is necessary to attract settlers.

*Inequitable method of irrigation district assessments.*—The contract of February 18, 1922, does not specify how the district shall raise the money due to be paid to the United States, other than that the district agrees that it will cause to be levied the necessary assessments and will use all of its powers and resources, including the taxing power of the district and the power to withhold delivery of water, to enforce collection. (Par. 20.) There is a proviso, however (par. 33), that after authorization of the contract by the voters of the district, the district should apportion the benefits under the contract to the lands in the district and obtain a judicial confirmation of the contract and the apportionment of benefits. However, the decree of confirmation of the contract makes no reference to any apportionment of benefits.

By the Colorado irrigation district law of 1905, under which the district operates, all lands are assessed for irrigation purposes at the same rate per acre (Compiled Laws of Colorado of 1921, sec. 2082), except that by amendment in 1925 (Session Laws of Colorado, 1925, ch. 120), where a contract is entered into between the United States and an irrigation district, providing for the payment of charges at an unequal rate per acre, district land so affected shall not be valued by the county assessor at the same rate per acre, but in such case the county assessor shall assess such district land in accordance with the certificate provided for in section 2081 of the Compiled Laws of Colorado of 1921, and in compliance with the contract with the United States. Section 2081 of the Compiled Laws of 1921, among other provisions, specifies that the board of directors of a district which has entered into a contract with the United States shall annually certify to the county commissioners the amount payable by each tract.



The above provisions of the law are referred to in some detail because it is believed that they must be the basis of a more equitable spreading of irrigation district assessments than now obtains in Orchard Mesa district.

Following the general provisions of the Colorado irrigation district law of 1905, all assessments by Orchard Mesa irrigation district are levied at the same rate per acre. The result is that the capacity of the land to yield an income has no consideration, and that "seeped" lands, incapable of producing any income whatever in their present condition, and general farming lands producing an annual income of \$50 to \$60 per acre, are called upon to pay exactly the same irrigation-district assessment as peach lands in the East Palisade irrigation district area which are reported as yielding a gross income of \$300 to \$900 per acre, as shown by Table 4.

It is believed that such a plan of assessing the construction and operation and maintenance charges is inequitable and unjustified, and that a plan based in part on the earning power of the land benefited should be substituted. In no other way, in the judgment of the writer, can the district be put on the financial basis necessary to meet its obligations to the United States. With an equitable assessment, it should be able to do so.

A revised plan of levying assessments in Orchard Mesa district, according to the principles outlined above, would not be out of line with practice in most western States. While Oregon, Montana, Arizona, and New Mexico follow Colorado in providing a uniform assessment rate per acre (except in case of contracts with the United States), the other States, except Utah, provide for assessment on an ad valorem or benefits basis.

Where the ad valorem basis is used, as in California, lands are valued annually for purposes of district assessment, and in practice are generally given valuations which reflect at least part of the differences in real value. In effect, this plan may therefore be made to approach or to accomplish the same results as an assessment on the basis of benefits. Where the benefits basis is adopted, as in Idaho, Washington, and several other States, the apportionment is made either after a bond issue has been authorized or annually.

It is recommended that either the ad valorem or benefits basis be adopted by Orchard Mesa district by means of a new contract to be entered into with the United States and the Grand Valley Water Users' Association. In choosing the plan, the important consideration should be provision for revaluation or re-apportionment of benefits, annually, or from time to time, as the earning power of the land changes. This revaluation should be as nearly self-executing as possible. No land should escape assessment in proportion to its earning power any more than should land be assessed entirely without regard to its earning power.

Without attempting to fix an exact assessment scale, since this should be worked out by the officials and landowners of Orchard Mesa district, in conference with the State and county authorities, and the Bureau of Reclamation, the following is suggested as probably an equitable base plan, using the ad valorem method followed in California, and not making the variations in valuation for assessment purposes reflect the full difference which there may be in the selling value of the land:

TABLE 6.—*Example of assessments in Orchard Mesa irrigation district if levied in approximate accordance with relative values of different classes of land*

[Area of each class of land assumed. Assessment does not include water toll of \$1.50 per acre irrigated]

Land classification	Area, acres	Valuation per acre for assessment purposes	Total assessed valuation	Assessed rate for each 100 of valuation	Assessment rate per acre	Total amount raised
No. 1 general crop land (west of Big Wash).....	4,000	\$100	\$400,000	\$4	\$4	\$16,000
No. 2 general crop land (west of Big Wash).....	1,800	75	135,000		3	5,400
"Seep" land, available for cropping.....	1,000	50	50,000		2	2,000
"Seep" land, pasture.....	500	25	12,500		1	500
No. 1 orchard land (east of Big Wash).....	1,700	200	340,000		8	13,600
No. 2 orchard land (east of Big Wash).....	600	150	90,000		6	3,600
Total.....	9,600		1,027,500			41,100

The assessment outlined above would raise slightly more than the amount called for in the 1929 assessment of the district, which is \$40,618.39, after adding 15 per cent provided for by law to cover delinquencies. On number-one general-crop land the assessment rate per acre would closely approach the \$4.25 levied for 1929. On land of more or less value than number one general crop the rate per acre is, of course, greater or smaller, in proportion to the differences in valuation.

Assessing charges for irrigation construction and operation on an ad valorem basis as outlined above has worked satisfactorily for many years in California and other States following a similar plan. It puts irrigation works in the same class as other public improvements and services, such as roads, schools, public buildings, maintenance of public order, public health, etc., to be paid for chiefly by taxes on the value of real property. There would be very great complaint if all of these other public improvements and services were required to be paid for on a flat acreage basis, yet such a method of payment would be as equitable as assessing irrigation charges without regard to land values.

Differences in values for the various classes of land are now, of course, recognized in Orchard Mesa Irrigation district by the county assessor when assessing for purposes of State and county taxation. Two general classes of land are used in these valuations—agricultural and orchard, the latter divided into bearing and nonbearing. Agricultural land is assessed at \$35 to \$75 per acre in the western portion, depending on cultural worth, location, roads, etc., while in the eastern portion the range is usually from \$60 to \$150, the latter figure being for the East Palisade, or "Vineland," section. Comparable differences are recognized in nonbearing and bearing orchards, valuations for the former ranging from as low as \$60 and \$75 to as high as \$150 per acre, and for the latter from \$150 or less to \$300 per acre.

It is believed that with some such readjustment of irrigation-district assessments as has been outlined, payments equivalent or substantially equivalent to those due under the contract of 1922 could be met without unreasonable hardship. Conditions certainly would be no more severe than on many other projects in the West that have experienced the same difficulties in obtaining settlement and which have received no Government aid whatever. With the suggested plan in effect there should be a reduction in delinquencies, and if this is the case the increase in the annual assessment to cover anticipated delinquencies might be reduced to the 15 per cent provided for in the irrigation district law, instead of the 20 per cent added in the levy for 1929.

It is also believed that if there is substantial improvement in the farm programs, so as to introduce more livestock and poultry and better rotations, all as advised by the Agricultural Extension Service, the larger assessments required to meet the increase in the Government construction charge from 4 to 6 per cent for 1932 and 1933 could likewise be paid without an unreasonable percentage of delinquency. During these two years, under the present contract, the annual assessment rate would be approximately \$6 on each \$100 of valuation and the rate per acre about \$6 for number-one general-farming land and \$12 for number-one orchard land. Lack of credit facilities needed to establish better farm programs might, however, defeat such a schedule. Furthermore, to increase the assessment rate to \$8 for each \$100 of valuation and the rate per acre to \$8 for number-one general-crop land, as would be necessary to meet the construction-charge payments during the last 14 years of the present contract, hardly seems feasible. For that reason an adjustment of the existing contract seems necessary.

It is believed that if such a revised contract is made it should not call for annual payments that would necessitate greater annual assessments per acre on No. 1 general crop land than \$6, not including the water toll of \$1.50 per acre. This could be accomplished by extending the 2 per cent payments for a period of 10 years from December 1, 1927, and requiring 4 per cent payments during the remaining 20 of the 30 years for retiring the construction charge recommended by the advisory committee report of November, 1927. The conviction is held, however, that a revision of the present contract without eliminating the present inequitable basis of irrigation district assessment would not make the contract a safe one, even if it were to be extended to 40 years, as the district has several times requested.

There is one other factor connected with the ability of the district lands to pay their water charges which should be mentioned, but which is not considered of sufficient moment to alter the above conclusions. That is, the apparent shrinkage in the area originally obligated for the construction cost.

At the time of the reconstruction contract with the Government, it was agreed that the area of the district would be increased to 10,005.3 acres, to be made up of the following areas:

Lands then in Orchard Mesa:	Acres
Irrigation district.....	8,366
Smith tract.....	472
East Palisade irrigation district (to come in when its bonds shall have been paid off, and in the meanwhile to pay the same charge as other lands in Orchard Mesa irrigation district).....	620
Other deeded lands.....	460.7
Government land.....	86.6
	10,005.3

The secretary of the district reports that the present area in the district, including East Palisade irrigation district, which is not yet legally included although paying water charges on a maximum of 560 acres to date, if 9,560 acres, this latter figure being somewhat of an estimate on his part, although the best information obtainable. Whatever the exact figure, all of the land that it was agreed would come into the district has not done so. Furthermore, the irrigable area survey on which the acreage was estimated was apparently optimistic to the extent of at least 5 per cent, and probably more.<sup>a</sup> A new irrigable survey would be very desirable in order to determine the net area that will be required to earn such assessments as are levied. This should eliminate small detached areas otherwise irrigable and such "seeped" lands as are not likely to be, from present indications, susceptible of profitable cultivation. Such a resurvey would be almost essential in putting into effect the revised plan of assessments that has been recommended herein.

#### SUMMARY AND CONCLUSIONS

(Following Economic Survey Form 32260)

1. It is believed that the Government reconstruction of this project was justified, except that it is questionable whether some of the flatter areas situated generally within the western portion should have been included if it were not for the fact that they had already been largely developed by small private enterprises before the Government reconstruction was undertaken, and many of the landowners were in distress. These lands, in their present condition, can not earn the charges assessed against them.

2. The eastern portion of the district, including East Palisade irrigation district (the "Vineland" area) which is to be added to it, is in part a highly developed and is in part now being developed into a very profitable or promising Elberta peach area. There should be no present concern regarding its success, although the future of specialty crops, like peaches to be shipped fresh, is always subject to hazard. However, the Palisade peach seems to have the advantage of a "quality" product. With the exception of "seeped" areas of undetermined future value, the western three-fourths of the district has the opportunity to be made into a successful general farming area, if the best practices and farm systems, including dairying and poultry raising, are followed. Alfalfa hay, alfalfa seed, corn, the small grains, potatoes, sugar beets, and some truck, are the promising crops to be raised, although better farming methods are needed to increase yields, perhaps particularly in the case of sugar beets.

3. Exact information is unavailable as to the extent of the unsettled, undeveloped land that is sufficiently productive to justify settlement under present agricultural conditions. An estimate is 2,500 acres; it is not likely to exceed 3,500 acres. An expert study of the unproductive or unsatisfactorily produc-

<sup>a</sup>No report of this survey, other than the maps, was available in the office of the Grand Valley project at Grand Junction. The maps, however, indicate that in some of the rougher portions of the district the "irrigable" land was scattered in small detached "islands" which it would be impractical to farm to 100 per cent of their area. Furthermore, the land classification which the superintendent reports was used, which was the same as for the Grand Valley project, provided that class 1 irrigable land should be that which was then under profitable cultivation, or could be brought under profitable cultivation for less than \$20 per acre; and class 2, irrigable land, other than class 1, which could be brought under profitable cultivation for less than \$40 per acre, and which included land with a depth of less than 12 inches and not more than 8 inches.

tive land (generally "seeped" land) from the standpoint of plants and soils is needed. Soil studies by the Colorado Agricultural College, not however, directed specifically to Orchard Mesa, raise a question as how best to make them productive. Probably some of them are not worth reclaiming. If they were to continue to be charged with an equal-rate-per acre assessment, it would be desirable to have them eliminated and the construction charge written off. Under the revised plan of assessment recommended, they should be able to be put into or continued in use and carry a part, if only a small part, of the water charges.

4. Delayed settlement has been affected to some extent by the adverse soil conditions in part of the western section of the district, but primarily by lack of settlers with sufficient capital and experience to establish the land on a profitable production basis. From two to three years are necessary to establish a crop on raw land; five or six years are necessary to bring an orchard into bearing, with a longer period usual due to the advantage of growing alfalfa for at least two years prior to planting. Although there are some frosts, and occasional hails in certain areas, climatic conditions are generally favorable for orchard fruits, particularly peaches, in the east end of the district, but conditions favoring codlin moth make apple growing, which at one time was general in part of the western portion, as in the main Grand Valley, unprofitable. The high water charges undoubtedly have delayed settlement at the western and central portion of the district, as they always do in general crop areas. Local taxation is not unusually high. Credit facilities, however, are inadequate, no loans on land being made because of the prior Government lien for construction, and personal and stock credit, while sufficient at 8 to 10 per cent interest for those with substantial assets, is not available to the extent needed by others.

5. It is questionable whether irrigation payments can be met by the general crop lands, especially those of poorer grade, under the present flat rate per acre basis. This is held to be inequitable and assessments on an ad valorem or benefits basis are recommended instead. Under the plan suggested, these would be a maximum annual irrigation assessment of \$6 per acre, not including water tolls, which now amount to \$1.50 per acre irrigated, on No. 1 general crop land, and double that on the producing orchards. The poorer lands would pay from 0.30 to \$1.50 per acre, if "seeped" or otherwise adversely affected to an equal degree, and up to \$4.50 per acre for No. two general crop land, again not including water tolls. For the first 10 years after December 1, 1927, the maximum assessments would be less.

Very little, if anything, is now being done to insure more rapid settlement of unused and partly used areas. The claim has been made that purchasers are discouraged by high water charges, which is partly true. It was hoped that the Grand Junction community, together with the district, could establish a revolving fund to establish land in crop on land taken by the district on tax deed. At a representative conference in Grand Junction this plan was held to be unfeasible because buyers are not available who could pay sufficient to make the fund revolve. Some tax-sale land has been purchased and established by private parties, but mainly in the east and where the settlement problem is not acute. It is reported that reasonable adjustments of delinquent district and State and county taxes can be obtained by bona fide purchasers. County and district authorities should, it is believed, go to the extent of cancelling all back delinquencies if necessary to obtain purchasers who are qualified and have sufficient capital and credit to succeed. If there are uncertainties as to title, the district should take necessary steps to clear it.

It is not believed that in the case of this project the Bureau of Reclamation should buy tax-title land and improve it. The responsibility is rather believed to be local.

6. No additional construction work is asked for.

7. The capital required to purchase a 40-acre general farm and bring it into full production was in a majority of cases estimated by farmers at \$2,000 to \$4,000 and by bankers at \$7,500 to \$10,000. A table is included which lists items totalling about \$9,500, of which \$4,200 would be required the first year, \$2,200 the second, and \$2,500 the third. This is much more than most of the Orchard Mesa farmers have had, yet few of them had enough. The figures given are for the average industrious and qualified settler. The exceptional man will get along with half the amount or less. Few exceptional farmers, however, were found. Credit for financing the year's business and for purchas-

ing livestock is frequently needed, and available at 8 to 10 per cent to those with assets to warrant the loans. Loans on the land, which are not now, generally available, would materially aid the situation.

8. It was not evident that credit facilities in Orchard Mesa district are likely to be improved, except as the farmers' equity in the land increases. As previously indicated, the banks, and this includes the Federal land bank, will not loan on the land. So far as could be ascertained, the only possible agency to make mortgage loans would be the Government, but such loans were not suggested and are not recommended. The only conclusion is that the situation must work itself out along present lines.

9. Additional agricultural extension work would undoubtedly be helpful, as in most sections. In the case of this district, however, which is close to the headquarters of an experienced and competent county agent, the lack of better farm programs is not due to any lack of information on the part of the farmers as to what is desirable. Better farm programs have been effectively presented. More good farmers with more capital would, it is believed, solve the better-farming problem with such aid as the present agency is prepared and equipped to give.

10. It is believed that this project can be more satisfactorily worked out under present Government auspices, than under the State, even if the State were prepared and disposed to take the burden over. Another agency, which has not itself advanced the funds that have been spent, would not be interested in the same degree as the United States in making the enterprise pay out.

11. The project superintendent at Grand Junction calls attention to the fact that subsection H of the fact finders' act reduces the penalty for delinquent accounts from 1 to one-half of 1 per cent per month, and that paragraph 19 of the contract of February 18, 1922, should be amended to conform therewith. This recommendation is of course indorsed.

The independence of an irrigation district, such as Orchard Mesa district, which has a construction contract with the Government in the conduct of its affairs is believed to be very desirable. The district has entered into a definite and what should be a solemn contract, for which it should accept full responsibility. It might nevertheless be true that the engineer, attorney, and accountant of the Government project which has direct relation with the district could from time to time be of material help to it. It is understood that the project superintendent of Grand Valley project gives freely of his counsel when called upon, but the question arose in the mind of the investigator as to whether more frequent contact, particularly along accounting and engineering lines, might not be advantageous. It is recommended that the question of the desirability of more cooperation along this line be referred to the project superintendent and project counsel, as well as to the district.

The final recommendation under this heading is that the Colorado Irrigation district law of 1905 be examined to determine what, if any, changes are needed to permit the revised plan of assessment proposed herein. Presumably, however, the present law is sufficient.

## SHASTA VIEW AND MALIN IRRIGATION DISTRICTS KLAMATH PROJECT, OREGON

(By Frank Adams, College of Agriculture University of California)

### CHRONOLOGY OF INVESTIGATION AND PROCEDURE

These two districts are covered in one report because they were originally started as a single project and because they operate under practically identical contracts with the United States, and under other conditions that are more or less similar. One, however, has met all obligations, both to the Government and to its other creditors, excepting the bond principal due July 1, 1929, while the other is in arrears and is unable to obtain water during 1929 because more than 12 months delinquent in its Government charges.

Both of the districts were visited during the period June 4 to 12, 1929. The first trip over them was made in company of Supt. H. D. Newell of the Klamath project. Subsequently the various parts of each were covered in

more detail either alone or in company of H. E. Wilson and C. M. Kirkpatrick, directors of Shasta View district; W. C. Dalton, organizer and representative of the largest land interests in Malin irrigation district; and R. C. Dobrusky, cashier of the Malin State Bank, Malin. The secretary of each district was visited and his books reviewed. One evening was spent in consultation with the board of directors of Malin district. All of the resident landowners and some of the nonresident owners of Shasta View district were interviewed, as were also six resident landowners in Malin district, and the principal officer in the two main banks in Klamath Falls and the Malin State Bank in Malin, the county agricultural agent, the attorneys of both districts, and others. Superintendent Newell and Engineer H. K. Smith of the Klamath project gave freely of their time in going over records and reports in the Klamath project files and in generally furnishing information and assisting the investigator. Subsequent to leaving Klamath Falls, the chairman of the bondholders' committee of Shasta View district was interviewed in San Francisco. Reports and information or suggestions were furnished by State Engineer Rhea Luper and Assistant State Engineer Charles E. Stricklin; also by Prof. W. L. Powers of the Oregon Agricultural College.

#### LOCATION AND DESCRIPTION

Shasta View and Malin irrigation districts are situated directly north of the Adams or "D" Canal of the Klamath project between Adams Point and Dalton ranch, but a short distance north of the California-Oregon line and of the dry bed of Tuile Lake. Shasta View district, comprising a gross area of about 4,600 acres, occupies the westerly and more northerly portion of the "Sand Hollow" area, and Malin district, of about 3,500 acres, the easterly and more southerly portion. The soils are all sandy, the soil survey of Klamath reclamation project (1910) classifying them as mostly Yakima sand, with a little sandy loam in the higher areas. An area of something less than 1,000 acres of blow sand is found near the western end of Shasta View district, and this district seems from general observation to be of a lighter texture than the average of Malin district. Elevations range from slightly under 4,100 to a little less than 4,200 feet. The topography of Shasta View district is mostly flat to gently rolling, with a small area having slopes too steep to irrigate conveniently. On the whole the slopes in Malin district are flatter than in Shasta View.

#### CLIMATE AND CROPS

Temperature conditions are considered to be slightly more favorable during frost periods in these districts than in the flatter Klamath project and rainfall probably a little less. During a 23-year period from 1906 to 1928 temperatures fell below 32° at Klamath Falls in all months of the year except 1 in 3 years, 2 in 4 years, 3 in 12 years, and 4 in 4 years. In Shasta View and Malin districts it was reported that crops are generally not safe from frosts until June 20, these sometimes occurring later. In 23 years between 1884 and 1926 for which the record is complete, the rainfall at Klamath Falls was never as much as 20 inches and was less than 15 inches in 22 years and less than 10 inches in 5 years. A 10-year record of observations on Tuile Lake shows only two years with rainfall exceeding 10 inches, the maximum being 11.49 inches.

The above climatic data establish the Shasta Basin as mainly confined commercially to forage and field crops, there being a limited amount of truck crops grown. The agriculture of the area, including Shasta View and Malin irrigation districts, is, in fact, essentially built up on a livestock basis. The county agent believes that potatoes, over a period of years, constitute the best cash crop. Alfalfa and clover seed are other cash crops, and, under certain farming set-ups, alfalfa also is grown for that purpose. "Climatic conditions, availability of high-producing stock, abundance of green feed, local grains, good roads, and an underproduced home market" were reasons given by the poultry committee of the Klamath County Agricultural Economic Conference in 1926 for recommending, under certain conditions, an expansion of the poultry industry.

The standard rotation of crops recommended by the county agent for Klamath Basin, is as follows, assuming a typical area of 60 acres: Alfalfa, 20 to 25 acres; pasture (blue grass, white clover, alsike clover, ladino—a new Italian clover—and English ryegrass, constitute the basic grasses for this purpose),



15 to 20 acres; potatoes, 10 acres; seed crops (red clover and perhaps alfalfa), 10 acres. Grains, generally wheat, would also have a place. For dairying only, good hay, roots, and pasture have been recommended as a standard rotation.

#### HISTORY OF NEGOTIATIONS WITH THE GOVERNMENT FOR CONSTRUCTION OF IRRIGATION WORKS

Klamath irrigation project, which furnishes water for irrigation to Shasta View and Malin, as well as to a number of other Warrent Act districts or projects in Klamath Basin, was started in the early years following the passage of the reclamation act. The original conception seems to have been a project that would take in all of the agricultural lands in the basin, extending from Klamath Falls to the Oregon-California line and south of that line into the Tule Lake district, at that time largely submerged by the waters of Tule Lake. It was expected, at least by landowners and entrymen; that the lands in Sand Hollow, now organized into Shasta View and Malin irrigation districts, would participate, although no record was located which gave assurance that they would. At any rate, at least part of the landowners in the Sand Hollow area were members of the Klamath Project Water Users' Association, entering into the usual stock subscription contracts under which they were obligated to make application for a water right under the Klamath project as soon as undertaken, and to proceed to perfect that right. Under these contracts the lands were liable for the expenses of the association and for the Government charge, when levied. The annual assessments of the association were levied against lands in Sand Hollow for some years after the probability of the inclusion of these lands in the main Klamath project ceased. Within the time available it was not practical to trace down these early transactions, but it was asserted by one prominent landowner in Malin district that he did not obtain clearance of his property until about 1915. Even as late as 1910-1912 lands were sold in what is now Malin district in anticipation of a Government high line. It was reported that the lands in both districts had mostly been filed on prior to 1910.

Without purporting to cover all negotiations between the landowner and the Reclamation Service, the following general communications relate to Government irrigation of the "Sand Hollow" lands:

Petition from landowners to project manager of the Klamath project dated April 14, 1914. As a result of this petition the landowners cooperated with the Reclamation Service in a survey and estimate for the extension of the Klamath project system to lands in "Sand Hollow" lying above the Griffith lateral and Adams Canal.

Mimeographed copy of a letter from the director of the Reclamation Service dated December 18, 1916, was addressed to the landowners and the homestead entrymen in the proposed "Sand Hollow" unit of the Klamath project. In this the results of the cooperative survey were reported. Two plans were outlined for irrigating about 13,000 acres, one involving a pumping lift of at least 35 feet to cover the full 13,000 acres, the other involving an additional lift of the same amount. It was stated that no definite estimate of cost could then be given for either plan. The preliminary estimate under the single 35-foot lift (Plan 1) was given as \$585,000, or \$45 per acre, and under the alternative plan (Plan 2) as \$481,000, or \$37 per acre. To both of these figures was to be added \$15 per acre carriage cost for the use of the main canal and other works of the Klamath project. In the letter the director stated that the Reclamation Service would be pleased to hear from the proponents of the proposed district as to the plan the people might wish to carry out.

On December 9, 1919, communications were addressed to Shasta View and Malin irrigation districts stating that the Reclamation Service was prepared to enter into contracts for the sale of water rights to the two districts, outlining substantially the conditions. The basic charge for all districts which might be irrigated by pumping from the canals of the project was fixed at \$38 per acre (which was not to include the cost of the districts' systems) plus additional drainage charges, and with maintenance and operation charges to be half the amount paid by project lands irrigated by gravity. Payments for constructions were to extend over 20 years. It was stated that the basic charge of \$28 per acre might have to be increased due to increased costs of construction, since the estimate was made under date of January 24, 1920. Malin



irrigation district advised that the terms submitted were satisfactory and a similar letter was received from Shasta View district.

Following the above preliminaries, the United States entered into a contract on September 9, 1922, with Malin Irrigation district, and on October 6, 1922, with Shasta View Irrigation district by which the United States agreed to furnish water to the districts from the "D" or Adams Canal at a cost of \$34 per acre, exclusive of drainage to cost not to exceed \$10 per acre for each irrigable acre of the districts. Payments under this contract were to be made over 20 years, the first, of 5 per cent, on December 1 of the year first following the year when water should be available, and the remaining 15 from the fifth to the twentieth years thereafter, the first 5 of the 15 to be 5 per cent and the last 10 of 7 per cent of the total. Payments for drainage were to be made in four equal installments commencing on December 1 of the year next succeeding the year in which the last installment of the \$34 construction charge should come due. It was further provided that the districts should annually pay maintenance and operation charges in the amount of half those paid by lands in Klamath Irrigation district served by gravity, these to be paid in one lump sum on July 1 of each year.

After the consummation of this contract with the United States the district were not able to proceed promptly with the construction of their systems. Shasta View Irrigation district had been organized on February 18, 1918, and then included most of the land in "Sand Hollow." Within a short time, however, the owners of the southern portion decided to proceed separately and in November, 1918, their lands were excluded from Shasta View district by action of its board of directors, filed and recorded February 4, 1919. On May 26, 1919, a final order was entered organizing Malin Irrigation district, and from then forward the two districts proceeded independently. Neither, however, was able to finance itself as planned, and it was not until February 3, 1925, that Shasta View district signed a contract (with the engineer and promoter of the district) for constructing its system, the principal owner in Malin district taking a contract at about the same time for building its works.

Before the building of the irrigation systems of the two districts was under way the act of December 5, 1924, had been passed. On May 29, 1925, both districts made application for revised contracts under that act, requesting that payments to the Government be made on the basis of 5 per cent of the gross annual income from the land. These requests were both indorsed by the project superintendent. Due to the fact that other legislation was under consideration no action was taken on these applications, and in 1926 both districts renewed their applications—Malin district on August 3 and Shasta View district on September 17—at the same time stating that if it was not possible to obtain new contracts under the act of December 5, 1924, amended contracts under the act of May 25, 1926, allowing 40 years for repayment, were desired. These requests were also indorsed by the project superintendent. In due time amended contracts under the last mentioned act were signed, that with Shasta View district on June 29, and that with Malin district on July 5, 1927.

#### OBLIGATIONS OF THE DISTRICTS UNDER THEIR PRESENT CONTRACTS WITH THE UNITED STATES

The amended contracts of 127 provide that, in the case of both districts, payment of unaccrued construction charges shall be made in 40 annual installments, of which the first five shall each be 1 per cent, the next 10 each 2 per cent, and the next 25 each 3 per cent of the total. The sums payable annually are divided into two equal installments payable June 30 and December 31, beginning with the year 1926. Payment for the cost of drainage works is provided for in equal installments over the same period of time as the construction payments. Operation and maintenance charges are made payable semiannually in advance on January 1 and July 1 of each year, beginning on January 1, 1928. The penalty of 1 per cent per month on delinquent accounts provided in the contracts of September 9 and October 6, 1922, is reduced to one-half of 1 per cent per month.

## BOND ISSUES FOR CONSTRUCTION OF IRRIGATION SYSTEMS

Bonds were issued in the amount of \$120,000 by Shasta View district and \$100,000 by Malin district for constructing their irrigation systems. Of the Shasta view issue \$93,300 were disposed of, \$89,100 going to the contractor. Of the Malin issue, \$89,100 were disposed of, mainly to the contractor, \$10,900 being held in escrow. The interest rate on the issues of both districts is 6 per cent, the bonds of both districts maturing from July 1, 1928, to July 1, 1943. The systems were constructed during 1925 and 1926, both districts receiving water in 1926.

## SETTLEMENT AND DEVELOPMENT IN THE DISTRICTS

The area in Shasta View and Malin Irrigation districts was partly dry-farmed for a number of years prior to the construction of the irrigation systems, and some land, particularly in Shasta View district, is still so farmed. With a single exception, all of those interviewed expressed the opinion that dry farming under the conditions present is not profitable.

Since irrigation water was made available, in 1926, the following areas in the districts have been irrigated, according to annual crop returns gathered by the Bureau of Reclamation:

Year	Shasta View	Malin
	<i>Acres</i>	<i>Acres</i>
1926.....	487	731
1927.....	717	1,247
1928.....	1,230	1,499

Shasta district, which is receiving no water in 1929, is now at a standstill. Malin district, on the other hand, will show a fair increase for this season.

Only a few farmers in Shasta View district are recent purchasers. Of 45 owners appearing on the 1927 assessment roll, only 6 can be so classed. Seven are old settlers, mainly of 15 to 20 years ago. The worst feature is that 28 of the 41 owners are nonresidents, partly because they are speculators only, partly because they have been unable to get a foothold and have moved away. Being without irrigation water during this year, the green fields usually present in projects that have had water for several years are largely absent, although when visited in June some grain, unirrigated, and a few alfalfa fields, also without water, were growing. Obviously under the conditions existing the district could not present other than a depressing picture.

Malin district showed a more satisfactory condition, although the settlement problem is still a difficult one. The history of settlement in this district is sufficiently interesting to justify a brief account of it.

About 2,400 acres out of the 3,479 in the district have been held for about 10 years by the Klamath Lake Land & Livestock Co. Previously this land had been owned by the Tule Lake Land & Livestock Co., which sold 10,000 acres to a company known as the Lakeside Co. which was to colonize the land. Some eight or nine years later the Klamath Lake Land & Livestock Co. took back from the Lakeside Co. the 2,400 acres, more or less, lying above Adams Canal and east of Malin. About 700 acres had been sold on contracts when it was thought the land would be irrigated by the Government, but these were given up when the prospects for a project ceased. The Klamath Lake Land & Livestock Co. at almost the same time had sold eight 40-acre tracts to settlers at \$50 per acre, all but three of the purchasers remaining.

It was the ownership of this land which had been taken back from the Lakeside Co., and the fact that the five of the eight who had purchased tracts in the expectation that water would be brought in were still without water, that was really back of the formation of Malin district, and the financing of its construction by the Klamath Lake Land & Livestock Co. Through the ownership of the larger part of the 3,479 acres of irrigable land in the district they had the most vital interest in obtaining settlers. They had watched the successful colonization of the area of which the small town of Malin is the

center and anticipated little difficulty in disposing of their holdings. Settlement, however, has been slower than expected. The company still owns or holds sales contracts on about 2,000 acres. Sales have been made at \$30 to \$35 per acre for raw sage land to \$50 per acre for cleared land along the highway. All of the land has been sold at least once, some more than once. In all 60 sales have been made, out of which there have been 18 cancellations. Thirty-one purchasers are still holding their contracts and most of them are on the land and are expected to remain, although some will need extensions. The holdings vary from 40 to 160 acres, 40 to 80 acres being usual. The company will sell for no down payments if the purchasers will go on to the land and improve it and pay the taxes and interest. Furthermore, they will give those who are making good whatever time is needed to pay the principal. They have about 1,300 acres still available for settlement of which 270 acres is south of the interstate line in California, the latter land not being in Malin district, but obtaining water through the district system under agreement with it and the Bureau of Reclamation. There are 11 new settlers, with holdings, totaling about 770 acres, in addition to those on land sold by the Klamath Lake Land & Livestock Co. Besides there are seven old residents and five nonresidents owning land not sold by that company.

While, as indicated, Malin district is making excellent progress in settlement, the problem of colonizing the remainder of their holdings in the district is not easy of solution. No land-selling campaign has been undertaken and no commissions have been paid, so that land prices have been kept to a relatively low figure. The company is willing to make these prices still lower. The difficulty, however, is that there are very few buyers with enough money to establish themselves, even on the liberal terms offered. This same difficulty applies to Shasta View district and reference to it will be made later.

#### STATUS OF ACCOUNTS WITH THE UNITED STATES

The amounts due the United States from Shasta View and Malin districts under their contracts, the terms of payments, and the irrigable areas subject to Government charge have been given previously. Water was delivered to the districts in 1927 on a rental basis. Construction charges commenced to accrue in each district June 30, 1928, and regular operation and maintenance charges on January 1, 1928. Malin district has met all payments that have come due. Shasta View district has paid no charges on account of construction and is now delinquent on such charges in the amount of \$1,966.56. Operation and maintenance charges of \$1,665.10 due January 1, 1928, and an equal amount due July 1, 1928, were paid. Both \$800 due on water rental for 1927 and operation and maintenance charges due January 1 and July 1, 1929, are delinquent. The status of its account as of August 3, 1929, is summarized below.

#### *Shasta View Irrigation District in Account with the United States as of August 3, 1929*

Contract value 3,856 acres at \$34.....	\$181, 104. 00
Building charges accrued to date:	
Due June 30, 1928.....	<sup>1</sup> \$655. 52
Due Dec. 31, 1928.....	<sup>1</sup> 655. 52
Due June 30, 1929.....	<sup>1</sup> 655. 52
	<hr/> 1, 966. 56
Total to become due.....	129, 137. 44
Operation and maintenance:	
Due Jan. 1, 1928.....	<sup>2</sup> 1, 665. 10
Due July 1, 1928.....	<sup>2</sup> 1, 665. 10
Due Jan. 1, 1929.....	<sup>2</sup> 1, 664. 35
Due July 1, 1929.....	<sup>2</sup> 1, 664. 34
Water rental for 1927.....	<sup>1</sup> 800. 00
Total delinquent.....	4, 128. 69

<sup>1</sup> Delinquent.

<sup>2</sup> Paid.

## FINANCES OF SHASTA VIEW DISTRICT

Besides being delinquent in its payments to the United States, Shasta View district is in default in bond interest due January 1 and July 1, 1929, amounting to \$11,220, on its first installment of bond principal amounting to \$5,000, due July 1, 1929, and protested warrants totaling \$16,599.46 as of June 12, 1929; total, \$32,819.46. On the latter date it had on hand with the county treasurer the following sums: General fund, \$23.75; operation and maintenance fund, \$608.78; bond-interest fund, \$61.84; total, \$694.37. It is also indebted to the Oregon Irrigation Commission for bond interest paid by it. Outstanding protested warrants include two held by the Bureau of Reclamation totaling \$2,465.10 for rental charges due December 31, 1927, and installments of construction due June 30 and December 31, 1928. The largest item in the outstanding accounts is \$8,617.67 due the California-Oregon Power Co. for electric power furnished to the district in 1926, 1927, and 1928.\* No assessment was levied in 1928 to cover amounts due the United States and the bondholders in 1929 and district operating expense, for that year. The district is therefore under financial reorganization at the instance of the bondholders and, as previously mentioned, is receiving no irrigation water during the current season. The pending financial reorganization will be discussed later in this report.

The outstanding bonds of the district, as previously indicated, amount to \$93,500, bearing interest at 6 per cent, and maturing serially beginning July 1, 1929, and ending July 1, 1942. Five thousand dollars were due on July 1, 1929, and 1930; \$6,000 will be due July 1, 1931, to 1935; \$7,000 on July 1, 1936, to 1940; and \$8,000 on July 1, 1941, and 1942. The total construction charge assessed against the district by the United States is \$131,104.

Assessments for meeting its payments to the United States and its other expenses are levied in September of each year by the board of directors of the district, the assessment being spread on the county assessment roll by the county assessor, and collected in the same manner as other municipal taxes. Each acre is assessed at the same rate, the areas assessed from year to year varying slightly, the total area assessed always exceeding the 3,856 acres found to be irrigable by the Secretary of the Interior in his public notice of August 23, 1927. The following have been the district assessments since 1921:

1921-22			1925-26		
Acreage-----	5,018.6		Acreage-----	4,741.80	
Levy-----	\$873.07		Levy-----	\$14,595.52	
Rate per acre-----	\$0.18		Rate per acre:		
			Unit 1 <sup>10</sup> -----	\$2.95	
			Unit 2-----	\$3.11	
1922-23			1926-27		
Acreage-----	5,018.6		Levy-----	\$16,080.00	
Levy-----	\$783.00				
Rate per acre-----	\$0.156		1927-28		
			Acreage-----	4,067.9	
1923-24			Levy-----	\$18,712.34	
Acreage-----	5,016.6		Rate per acre:		
Levy-----	\$2,273.30		Building-----	\$1.70	
Rate per acre-----	\$0.44		Operation and m a i n t e- nance-----	2.90	
				\$4.60	
1924-25			1928-29		
Acreage-----	4,118.7		No levy made.		
Levy-----	\$6,713.00				
Rate per acre-----	\$1.63				

The relation of the charges due from the district to the United States to other expenses is shown by the budget adopted by the district for the year 1928, levied in 1927, given below. The amounts provided for the United States for construction and for maintenance and operation are \$1,311 and \$3,300, respectively, a total of \$4,611. The amount provided for bond interest—no bond principal due this year—is \$5,700; for electric power, \$3,200. The \$1,600

\* Figures furnished by power company. According to the assistant State engineer, the warrants held by the power company in May, 1929, totaled \$9,864.29.

<sup>10</sup> Certain special expenses are assessed against certain areas, designated units 1 and 2.

for "Water—U. S. Reclamation" may be partly for excess water over the 2 acre-feet per acre allowed under the Government contract, and partly the \$800 still due the United States on 1927 water rental. It will be noted that the budget contains no increase for delinquencies.

*1928 budget, Shasta View irrigation district*

Directors' salaries-----	\$100	
Secretary's salary-----	300	
Printing and office supplies-----	25	
Election expense-----	25	
Pump man-----	600	
Ditch rider-----	600	
Water—U. S. Reclamation-----	1,600	
United States operation and maintenance-----	3,330	
Material and labor-----	2,000	
Electric power-----	3,200	
Total, general-----		\$11,780
Bond interest-----	5,700	
U. S. Reclamation charge (building)-----	1,311	
Total construction-----		7,011
Total budget-----		18,791

A complete list of Irrigation district assessment delinquencies was prepared by the district in June, 1929, this covering the assessment years 1921 to 1927, and the tax years 1922 to 1928. The totals for each year are inserted below. The sum of all delinquencies is \$35,851.04, which includes penalties and interest. The list was checked over with one of the district directors and it appeared that only seven landowners had paid the 1928 tax. Since no assessment was levied by the directors in 1928, for collection in 1929, the entire district is equivalent to being delinquent in 1929, at least for construction and maintenance and operation charges due the United States, these being due and payable under the contract, regardless of whether water is used.

*Delinquent irrigation district assessments, Shasta View district*

1921-----	\$100.03	1926-----	\$11,085.10
1922-----	83.14	1927-----	15,102.58
1923-----	519.15		
1924-----	2,027.90	Total-----	35,851.04
1925-----	6,983.14		

FINANCES OF MALIN IRRIGATION DISTRICT

The total construction charge allocated to Malin irrigation district by public notice of August 11, 1927, is \$118,292.80. The outstanding bonds of the district amount to \$89,100, which mature July 1, 1928, to July 1, 1942, at the rate of \$4,000 annually 1928 to 1931, \$5,000 annually 1932 and 1933, \$6,000 annually 1934 to 1936, \$7,000 annually 1937 and 1938, \$8,000 annually 1939 to 1941, and \$9,000 annually thereafter. A check with the county treasurer's office on June 12, 1929, showed no delinquencies on either bond interest or bond principal, no unpaid warrants, and the following sums standing to the credit of the district: General fund, \$2,954.37; operation and maintenance fund, \$3,780.80; bond and interest fund, \$468; total, \$7,203. Sufficient was not on hand to meet bond obligations due July 1, 1929, but receipts to cover were anticipated.<sup>11</sup> As will be indicated later, however, the main financial dependence of the district has been the interest that controls the largest area of land, rather than the smaller landowners.

The annual assessments of Malin district since 1923 have been as given below. Beginning with 1926-27, the area assessed has been, or has approxi-

<sup>11</sup> Later advices are that the bond interest due July 1, was paid but not the bond principal; also that payment of the bond principal installment will be accomplished before Jan. 1, 1930.

ated, the 3,479.2 acres specified as irrigable under the contract by the public notice.

1923-24:		1927-28:	
Acreage -----	3,488.3	Acreage -----	3,479.20
Levy -----	\$2,497.00	Building levy -----	\$711.23
Rate per acre -----	\$0.72	Building levy per acre -----	\$0.204
1924-25:		Operation and maintenance levy -----	\$12,297.27
Acreage -----	3,488.3	Operation and maintenance levy per acre -----	\$3.534
Levy -----	\$7,447.00	1928-29:	
Rate per acre -----	\$2.135	Acreage -----	3,463.5
1925-26:		Building and United States contract and bonds -----	\$11,861.22
Acreage -----	3,585.70	Building and United States contract and bonds per acre -----	\$3.425
Building levy -----	\$2,750.00	Operation and maintenance levy -----	\$7,984.01
Building levy per acre -----	\$0.76	Operation and maintenance levy per acre -----	\$2.291
Operation and maintenance levy -----	\$5,809.93		
Operation and maintenance levy per acre -----	\$2.38		
1926-27:			
Acreage -----	3,479.20		
Building levy -----	\$5,500.00		
Building levy per acre -----	\$1.561		
Operation and maintenance levy -----	\$8,769.20		
Operation and maintenance levy per acre -----	\$2.52		

As in the case of Shasta View district, the detail of the last annual budget of the district was obtained and is inserted below, being for 1928-29. The usual percentage for delinquencies is included. In other respects the budget is comparable with that of Shasta View district, except that it has no charge for water and includes a sum for the retirement of bond principal falling due.

*1928-29 budget, Matin Irrigation District*

United States operation and maintenance due July 1, 1929 -----	\$1,508.91
Same due Jan. 1, 1930 -----	1,508.92
Expense "A," canal lining -----	149.00
State industrial accident commission -----	50.00
Electric power -----	3,000.00
Elections -----	20.00
Printing and office supplies -----	10.00
Emergencies -----	500.00
Pump operation -----	750.00
Ditch riders -----	625.00
Legal services -----	150.00
Salaries of directors -----	200.00
Salary of secretary -----	150.00
Estimated delinquency, operation and maintenance -----	862.18
	<u>9,484.01</u>
Less revenue from lands in California -----	1,500.00
Total for operation and maintenance -----	<u>7,984.01</u>
Bond interest -----	5,600.00
Installments on United States construction charge -----	1,182.93
Bond retirement due July 1, 1929 -----	4,000.00
Estimated delinquencies -----	1,078.29
Total bond and contract fund -----	<u>11,861.22</u>
Total budget -----	<u>19,845.23</u>

## ECONOMIC STATUS OF THE SETTLERS

The principal statistical information obtained from the settlers or land-owners in the two districts with the standard questionnaire is tabulated below. (Tables 1 and 2). Both districts, however, are of such recent development that the figures are not conclusive. For instance, a majority of the resident owners in Shasta View district are not to be classed as "settlers," but rather as owners who acquired their land from 10 to 20 years ago, hoping eventually to obtain irrigation water, and who were the promoters of the irrigation district and of the contract with the Government. Several of the larger places listed are merely held speculatively. Taking the two districts together, only half of the farms listed have been purchased by their present owners since construction of the district irrigation systems was started.



TABLE 1.—Summary of statistical data relating to capital at settlement, investment, gross income, taxes, and indebtedness for 12 farms in Shasta View Irrigation District, Klamath reclamation project, Oregon

Farm No.	Area, acres	Amount of capital at settlement		Estimated cost of farm buildings		Estimated cost of machinery and equipment		Years on this farm or crops grown, owned	Gross income from products sold, 1928		Principal source of farm income, 1928	Other income, 1928	State and county taxes, 1928	Irrigation district taxes, 1928, including construction and maintenance and operation due United States	Taxes delinquent	Present indebtedness exclusive of construction bonds and delinquent taxes
		Cash	Stock equipment and other	Purchase price of land per acre	Present	Additional needed	Present	Additional included, live-stock	Total	Average per acre for acre irrigated, 1928						
1	74	\$500	\$730	\$12	\$735	(1)	\$580	(1)	\$946	\$21.50	Wheat, rye, hogs.	\$1,300	\$23	\$287	\$290	(1)
2	158	650	7,000	26	3,700	\$1,500	600	\$3,600	734	9.79	Potatoes, hay, grain.	650	41	728	400	(1)
3	20	700	2,600	(1)	1,050	300	(1)	575	660	36.66	Alfalfa hay.	560	6	90	(1)	(1)
4	109	(1)	500	(1)	4,850	(1)	1,100	(1)	1,755	31.90	Dairy products.	(1)	50	503	628	\$1,500
5	93	20,000	(1)	50	9,000	(1)	750	(1)	1,950	11.17	Potatoes, hogs.	700	53	422	(1)	(1)
6	116	5,700	(1)	51	1,975	625	5,400	250	2,560	73.14	Dairy products, cows and calves, poultry.	4,000	96	241	(1)	(1)
7	180	1,200	1,100	(1)	5,200	200	500	1,700	1,945	14.96	Wheat, poultry, hogs.	3,500	53	714	336	(1)
8	160	1,550	700	19	1,350	300	175	(1)	1,300	16.08	Wheat, rye, hogs.	600	47	161	(1)	(1)
9	20	200	1,700	50	310	1,000	87	30	800	88.88	Dairy products, hogs.	100	6	92	(1)	113
10	196	1,000	7,500	22	875	700	(1)	(1)	(1)	(1)	(1)	(1)	75	850	571	(1)
11	360	(1)	(1)	20	(1)	(1)	(1)	(1)	6,780	27.12	Wheat, rye.	(1)	100	758	858	(1)
12	109	(1)	(1)	14	(1)	(1)	(1)	(1)	1,295	17.26	Dairy products, cows, and calves.	(1)	33	471	1,072	(1)

1 None now.

2 None.

3 Trade.

4 Entry.

5 Unknown.

6 Indefinite.

7 None owned; not on land.

8 Nonresident owner; hires all work done.

9 Was not covered by standard questionnaire.

TABLE 2.—Summary of statistical data relating to capital at settlement, investments, gross income, taxes, and indebtedness for 6 farms in Malin irrigation district, Klamath reclamation project, Oregon

Farm No.	Amount of capital at settlement		Purchase price of land per acre	Estimated cost of farm buildings		Estimated cost of machinery and equipment		Years on this farm or years owned	Gross value of crops grown, 1928	Gross income from products sold, 1928		Principal source of farm income, 1928	Other income, 1928	State and county taxes, 1928	Irrigation district taxes, 1928, including construction and maintenance and operation due United States	Taxes on delinquent bonds and delinquent taxes	Present indebtedness exclusive of construction bonds and delinquent taxes
	Cash	Stock equipment and other		Present	Additional needed	Present	Additional needed, including live-stock			Total	Average per acre for acre irrigated, 1928						
1	\$1,400	\$1,500	\$35	\$1,600	\$300	None	\$960	3	(1)	\$35	-----	Poultry	None.	\$12	\$230	None.	None.
2	80	2,200	22	900	600	\$500	None.	4	\$1,170	1,670	\$31.31	Dairy products, wheat	\$900	20	227	None.	None.
3	160	None.	25	250	3,000	1,640	3,000	4	820	927	8.35	Dairy products	300	43	608	\$1,288	None.
4	40	900	35	600	775	None.	1,400	2	160	1,840	184.00	Poultry	None.	30	184	None.	None.
5	80	500	28	1,100	500	262	625	4	1,081	1,646	19.32	Wheat, poultry	1,400	45	149	None.	\$900
6	3,500	250	25	1,500	600	1,010	2,000	1	None.	None.	None.	None.	None.	70	368	None.	650

1 Nothing; crop lost.

*Farm area.*—The areas of the holdings acquired from 10 to 20 years ago are not indicative of the trend in the two districts. The 40 and 80 acre holdings in Malin district are more typical. A majority of those interviewed preferred 80 acres, two suggested 40 to 60 acres, two suggested 40 acres, and only two more than 80.

*Capital at settlement.*—Counting only the 10 who have acquired their holdings since construction of the irrigation systems, the cash capital at settlement varied from nothing to \$3,500, and the total assets from \$1,230 to \$7,650, the larger figure including a \$6,000 home in Oakland on which \$2,000 has been borrowed, making the settler's available assets only \$2,650. The suggested requirements ranged from \$1,000 to \$10,000, the one suggesting the smaller figure being not likely to succeed, and the one who suggested \$10,000 being more interested in business than farming and unsuccessfully endeavoring to farm 196 acres through renters. A majority suggested that from \$2,000 to \$4,000 is needed, five from \$3,000 to \$4,000.

*Cost of farm buildings.*—Most of the new settlers have been content to get along with inexpensive farm buildings costing about \$1,000 or less. Only one of them has built extravagantly. Combining the present cost of buildings and the additional needed, the building requirements are not excessive, all but two of the new settlers suggesting under \$2,000.

*Gross income from products sold in 1928.*—Very few, if any, of the farms of these districts are yet fully organized for production. Out of a total of 2,076 acres in the farms visited, of which all but 287 acres is reported irrigable, only 1,077 acres was irrigated in 1928. But little of the irrigated land is well prepared, so that yields are bound to be low. Wheat and rye entered to a considerable extent into the cropping, and in some cases potatoes, with one exception the land not having been previously in alfalfa. Under such conditions high or even good returns are not possible. Dairy or poultry products came first as income producers in 8 out of the 18 cases included. Where these were produced the incomes usually were the largest. Excepting in one case—a 20-acre farm, all in alfalfa—wherever the gross income exceeded \$30 per acre, the chief income was from dairy or poultry products or from both.

*Taxes.*—State and county taxes are not high. Irrigation district taxes or assessments, as indicated in previous pages, were \$4.60 per acre in Shasta View district in 1927–28 and \$5.72 per acre in Malin in 1928–29. Eight of the eighteen cases show part or all of these amounts delinquent—in some cases also the taxes due in previous years. In one case taxes are delinquent for three years.

#### WATER CHARGES IN OTHER KLAMATH BASIN PROJECTS

Some sentiment was encountered to the effect that the Government construction charge is unfairly high in Shasta View and Malin districts as compared to other pumping units of Klamath project. The charges against all of the units, including outstanding bonds in irrigation districts, were therefore kindly compiled by Project Superintendent Newell, the figures being summarized below in Table 3. It was not the function of the investigator to pass judgment on the justice of the criticism regarding the charge to Shasta View and Malin districts. As was noted under the history of negotiations with the Government for construction of irrigation works for the Shasta View and Malin area, however, the amount of the charge was formally assented to by the districts when contracts were signed with the United States. As will appear later, it is clear to the investigator that the point is not material to the present financial problems of the districts.

TABLE 3.—Summary of irrigation charges in the different units of Klamath reclamation projects, exclusive of annual assessments of irrigation districts

Designation	Irrigable area (acres)	Method of irrigation	Approximate total United States building charge per acre	Approximate amount repaid per acre	Approximate amount outstanding bonds per acre	Approximate annual United States building repayments per acre	Approximate annual United States operation and maintenance charge per acre
Klamath irrigation district.....	41,550	Gravity...	<sup>1</sup> \$50.00	<sup>1</sup> \$17.10	None.	{ <sup>1</sup> \$1.00— 2.00	{ \$1.35— 2.00
Langell Valley irrigation district.....	14,400	do.....	59.00	.17	None.	<sup>4</sup> .56	.09
Tule Lake lands, mostly public.....	11,900	do.....	88.35	( <sup>5</sup> )	None.	None.	1.85-2.50
Van Brimmer Ditch Co.....	5,000	do.....	( <sup>6</sup> )	None.	None.	None.	None.
Klamath drainage district.....	20,000	Not determined.	7.50	3.00	\$2.56	.29	.002
Horsefly irrigation district.....	10,434	Pumping	<sup>7</sup> 15.00	1.25	12.04	( <sup>9</sup> )	.07
Pine Grove irrigation district.....	954	do.....	16.00	4.70	15.72	1.12	.08
Enterprise irrigation district.....	2,980	do.....	16.00	2.40	15.00	.80	.18
Sunnyside irrigation district.....	595	do.....	34.00	.68	None.	( <sup>9</sup> )	} 80-1.00
Shasta View irrigation district.....	3,856	do.....	34.00	None.	24.25	( <sup>10</sup> )	
Malin irrigation district.....	3,479	do.....	34.00	.34	25.60	( <sup>11</sup> )	
Contracted individual pump areas...	1,785	do.....	34.00	.34	None.	-----	-----

<sup>1</sup> Sum of all charges on each unit divided by its area. First and second units opened at \$30, third unit at \$45 for public land and \$39 for private land, to which some penalties are to be added. The first unit was increased by \$12.50 mostly for drainage, and all units were increased \$4.50 for concrete flume and lining, and are to be increased by \$7.50 additional for more drainage.

<sup>2</sup> Ignores small area in Tule Lake division.

<sup>3</sup> Normal is \$1; extra dollar is back interest and deferred charges.

<sup>4</sup> Same rate of payment as Sunnyside, Malin, Shasta View, and miscellaneous areas.

<sup>5</sup> About 3,000 acres made initial installment of \$4.50 per acre being carried as a credit.

<sup>6</sup> Paid up.

<sup>7</sup> Sum of all charges divided by area.

<sup>8</sup> 4 years, at \$0.29; 10 years, at \$0.42; 25 years, at \$0.53.

<sup>9</sup> 5 years, at \$0.34

<sup>10</sup> 10 years, at \$0.68.

<sup>11</sup> 25 years, at \$1.02.

#### ABILITY OF SHASTA VIEW AND MALIN DISTRICTS TO MEET THEIR IRRIGATION PAYMENTS

The first step in determining whether Shasta View and Malin districts can meet their irrigation payments seems to be to ascertain whether farming there can be made to pay. If it can be made to pay, what is necessary is such adjustment of irrigation payments as will ease over the period of settlement and development.

As already shown, the facts derived by use of the standard questionnaires were not conclusive, because there are few established farms in either district. On the other hand, the general information obtained from the answers to the questionnaires and from discussions with the farmers interviewed and others convinced the investigator that farming in these districts can be made profitable by the settler with sufficient capital to equip his farm and sufficient intelligence and experience to follow the methods that have been proven in other parts of Klamath Basin.

While it is believed that from 60 to 80 acres makes a desirable farm unit in Shasta View and Malin districts, it is recognized that many must start on 40 acres. Inquiry was made from a number of settlers as to local costs of buying and equipping a 40-acre farm and as to expenses and income. Perhaps the figures worked out in conjunction with Mr. Frank Payr, one of the most substantial and most successful farmers in Shasta View district, are the most satisfactory, although those relating to income probably represent a little better result than would be obtained by the average settler. They are given in detail below. It will be noted that no income is figured from such sources as poultry or hogs, and what many farmers would obtain from them might be considered as extra.

Investment:	Desirable	Necessary
40 acres, at \$35-----	\$1,400	\$1,400
Fencing-----	160	160
Cross fencing-----	75	75
Corrals-----	25	25
Dwelling-----	1,500	600
Barn-----	1,000	500
Small buildings-----	500	200
10 cows, at \$125-----	1,250	1,250
Brood sow-----	30	30
Chickens-----	200	200
Team-----	150	150
Plow-----	25	25
Mowing machine-----	110	100
Rake-----	45	45
Wagon-----	175	100
Harness-----	35	25
Tools-----	50	40
Derriek-----	150	100
Small automobile-----	650	300
Household equipment-----	250	250
	<u>7,780</u>	<u>5,575</u>

Annual income (crops, alfalfa, 20 acres; pasture, 10 acres; potatoes, 5 acres; small grains, 5 acres):

Cream from 10 cows, at \$120-----	\$1,200
8 calves, sold at 2 months old, \$25-----	200
5 acres small grain, 30 bushels, at \$1-----	150
5 acres potatoes, 125 sacks, at \$0.75-----	450
Poultry-----	200
1 brood sow-----	60

Total gross income----- \$2,200

Annual expense:

Irrigation charges, \$6 per acre-----	240
State and county taxes-----	40
Family living (minimum)-----	500
Insurance-----	150
Medical help and medicines (minimum)-----	100
Operation of automobile-----	180
Electricity-----	100
Incidentals-----	100

Total expense----- 1,410

Net income for paying interest and principal on land----- 850

Average per acre, \$21.25.

The amount set out under "Investment" is not, of course, required at the outset, and few new settlers are likely to have even that considered necessary. It is over \$2,000 less than the average gross investment per farm in the Klamath project as given for 1926 in the report of the Klamath County Agricultural Economic Conference. Land can now be purchased in Malin district without down payment. The same is undoubtedly true as to Shasta View. Furthermore, land prices are so demoralized in Shasta View because of the present financial condition of the district that land can be bought for taxes, or for almost any reasonable figure, and probably on terms to suit the purchaser. As soon as the finances of the district are satisfactorily reorganized, the market for land will be firmer. Reducing the amount listed above as necessary by the purchase price of the land leaves \$4,175 required for a start. Reducing this still further by using a temporary shack instead of a small dwelling, cutting the family living expenses, using sheds instead of a barn, buying all but 8 cows on credit, and borrowing farm machinery and other equipment or purchasing old stuff, some could set up with, perhaps, as little as \$2,500. Until most of the necessary items are provided, however, the income will not equal that set out under the second heading.

If a farmer on a 40-acre tract were to raise only alfalfa, obtaining 3 tons per acre and selling it for \$10 per ton, his gross income would be reduced to \$1,200. It is obvious that on such a basis, farming in these districts would not justify the high irrigation charges. On the other hand, with a balanced farm such as that outlined, even if the income listed might be considered a little optimistic, the irrigation charges are not a high percentage of the total expenses of production, and there is a fair net income for meeting interest and deferred principal payments on the land.

In the report of the Klamath County Agricultural Economic Conference that has been previously mentioned the committee on farm management and economics analyzes the farm enterprises of Klamath County. Of a number of interesting tables in their report, their Tables IX and X are inserted below as Tables 4 and 5. They show the estimated cost of production and computed net returns for Klamath project farms in 1926. In later tables—their Tables XI and XII—they compute net return per acre of \$11.25 and \$18.60, the latter being for a suggested percentage basis for various crops and probable average acre returns. With reference to selection of enterprise the committee makes the following statement:

"From the analysis made by the committee (as indicated in Table VI) potatoes, clover seed, pasture, alfalfa, and wheat appear to be the best crops for producing revenue. The livestock enterprises of dairying, poultry, farm sheep, and hogs are all physically adapted to the project and with reasonable management are profitable and sound."

TABLE 4.—*Estimated cost of production of crops per acre, 1926*

[Includes all costs except interest on investment, overhead labor, and hauling to market]

Crop	General expense <sup>1</sup>	Man labor at \$0.40	Horse labor at \$0.12½	Machine expense	Material, seed, sacks, twine, etc.	Total per acre
Alfalfa hay (experiment-station survey)...	\$3.85	\$11.41	\$2.99	\$1.85	\$1.23	\$21.33
Potatoes <sup>2</sup> .....	4.00	39.01	10.23	5.17	25.99	84.40
Pasture—tame grass <sup>3</sup> .....	4.00	2.55	1.11	0.91	4.74	13.31
Wheat (committee estimate).....	4.00	3.81	1.98	4.90	2.40	17.09
Oats (committee estimate).....	4.00	3.81	1.98	4.50	3.03	17.32
Barley (committee estimate).....	4.00	3.81	1.98	4.26	2.26	16.31
Rye (committee estimate).....	4.00	3.81	1.98	4.10	1.67	15.56
Clover seed (grower's record).....	4.00	14.00	4.20	10.18	1.40	33.78

<sup>1</sup> General expense covers irrigation costs, taxes, insurance, and general repairs chargeable to crops.

<sup>2</sup> Estimates of 12 potato growers producing 240 acres potatoes.

<sup>3</sup> Estimate of 3 growers producing 79 acres irrigated pasture.

<sup>4</sup> Includes average cost of establishing pasture the first year (\$1.97) plus manure used per acre (\$2.77).

TABLE 5.—*Computed net returns per acre from crops*

Crop	Average yield per acre	Average price per unit	Average gross value per acre	Average cost per acre <sup>1</sup>	Average net returns per acre
Alfalfa hay.....	2.7 tons.....	\$11.75	\$31.72	\$21.33	\$10.39
Other hay.....	1.4 tons.....	11.14	15.59	(?)	.....
Pasture <sup>2</sup> .....	.....	.....	25.25	13.31	11.94
Wheat.....	16.5 bushels.....	1.48	24.42	17.09	7.32
Barley.....	21.4 bushels.....	.83	17.76	16.31	1.45
Oats.....	25 bushels.....	.63	15.75	17.32	-1.57
Rye.....	9.9 bushels.....	1.06	10.49	15.56	-5.15
Potatoes.....	129 bushels.....	1.03	132.87	84.40	48.47
Clover seed.....	500 pounds.....	.20	100.00	33.78	66.22

<sup>1</sup> Average cost per acre is estimated. It includes all cost items except "interest on investment," "overhead labor," and "hauling to market."

<sup>2</sup> No data.

<sup>3</sup> The figures are for average pasture. Good irrigated pasture will produce four times this amount.

Information obtained regarding markets for produce raised in Klamath Basin indicates that they are not unsatisfactory. A cooperative cheese factory in the town of Malin is available to the Shasta View and Malin areas, about 90 per cent of the stock being owned by farmers, and there is a creamery at Merrill, about 10 miles distant. The cheese factory at Malin opened November 8, 1921, and has operated every day since then, its sales in 1928 amounting to over \$125,000. The output is marketed partly locally but mostly in northern California. The farmers are paid for butterfat according to the Portland market. Alfalfa shipped off the farms goes largely to the Willamette Valley and Oregon coast ports. Most of the crop, however, is used within Klamath Basin, because of the demand for feed for sheep, cattle, and dairy cows. About one-third of the potatoes were reported as going to Portland, Rogue River Valley, and Willamette Valley points, the rest mainly to California. Lambs, which are shipped from July to January or February, go south to California. Surrounding lumber camps give a large local demand for beef cattle. Trucks have been used mainly in shipments out of the basin, except in the case of alfalfa and livestock. With the completion this summer of the Klamath Falls-Alturas line of the Southern Pacific, the distance from Shasta View and Malin districts to railroad transportation will be reduced from an average of 25 to 30 miles to an average of about 8 or 10.

#### PROPOSED FINANCIAL REORGANIZATION OF SHASTA VIEW DISTRICT

Recognizing the need for doing something to better conditions in Shasta View district, the State engineer of Oregon and a committee representing the bondholders of the district have been working for some months to find a solution. Defaulting of bond interest January 1, 1929, and of the first installment of \$5,000 due on bond principal July 1, 1929, were forecast, and both have occurred. The details of the proposals, so far as the United States is concerned, are fully covered by letters in the files of the Bureau of Reclamation. Briefly, several things were suggested, chiefly as follows: (1) That the Secretary of the Interior withdraw his public notice of August 23, 1927, in which the irrigable area in the district was fixed at 3,856 acres, and issue a new notice covering about 2,000 acres, thus reducing from \$131,104 to about \$68,000 the amount to be repaid to the United States for construction; (2) that the quantity of water to be delivered to the district by the United States be increased from 2 to 2.5 acre-feet per acre, in order to reduce the prospective excess water charge; (3) that water be furnished to the water users on a rental basis for a few years and demand for immediate payment of delinquent accounts be withheld.

From the beginning of the reorganization proposals it has been recognized that the maturity dates of the irrigation district bonds must be put off, and this is one of the elements of the plan that has been agreed upon between the bondholders' committee and the directors of the district. The present maturities, as previously given, are 1929 to 1942. The agreement is to extend these to from 1940 to 1955 by exchange for a refunding issue. As against the present interest rate of 6 per cent, it is agreed that the rate shall be 3 per cent for the first 5 years, 4 per cent for the next 5 years, and 5 per cent for the remaining 15 years. The substance of the more important of the remaining provisions of the agreement between the bondholders' committee and the district, which is dated May 2, 1929, is as follows:

(a) That the irrigation district shall take the necessary steps to collect at least \$7,850 of past due irrigation district assessments, such amount to be in the hands of the county treasurer of Klamath County by July 1, 1929.

(b) That the district will promptly take the necessary legal steps to foreclose tax liens against present and future delinquent landowners.

(c) That the district will immediately enter into negotiations with the Bureau of Reclamation and the California-Oregon Power Co. to reinstate its credit.

(d) That a definite settlement program will be encouraged and adopted.

(e) That all of the new authorized but unissued bonds of the district will be canceled.

(f) That the refunding bonds to be issued will be issued under the irrigation district bond law of Oregon as amended in 1929 by House bill 545; that the area to be specifically assessed with recorded assessments shall not be less than 3,800 acres, the uniform assessments not less than \$25 per acre,



and the amount of refunding bonds not less than the present outstanding bonds of the district.

(g) That upon payment by the district of the \$5,000 in interest coupons due January 1 and July 1, 1929, the proceeds will be applied to the current indebtedness of the district to the Bureau of Reclamation and the California-Oregon Power Co., on distribution basis mutually agreed upon; that the district will hold inviolate from any other use the remaining \$2,850 of overdue assessments collected as provided in paragraph (a) above for the purpose of paying interest maturing on refunding bonds for the year 1930.

In June, 1929, the attorney of Shasta View district was initiating proceedings for foreclosure on outstanding delinquencies. The funds required to be raised under paragraph (a) above had not, however, been collected.

In connection with the proposed reorganization of the district, the State engineer's office has outlined certain changes in the system which it deems desirable, the idea being to maintain the area of 3,800 acres specified in the agreement between the bondholders and the district. The area under the relict canal would be reduced to 1,076 acres by elimination of all below the east line of the NW quarter of the NE quarter, sec. 3, T. 4 S., R. 12 E., because of excessive seepage losses. In order to balance this loss it is proposed to add 385 acres either in the west end or east end, additional pumping plants being required in either case. The plan would also involve some relocation of other pumps. With these changes the State engineer's office works out a table of total charges from 1929 to 1954, when the refunding bonds would be all retired. In this computation it figures the Government construction and operation and maintenance at \$1.25 per acre per annum and district charges for operation and maintenance, power, and miscellaneous at \$2 per acre per annum, both of these items remaining constant throughout the period and presumably being considered as averages. Adding bond interest and principal payments according to the schedule agreed on makes the total annual assessment increase gradually from \$4 up to \$6.57 per acre per annum. The figures do not include the \$0.50 per acre per annum required by law to be levied during the first five years.

Further reference will be made to the plan of reorganization under the next heading.

#### FINAL COMMENTS ON BETTERING CONDITIONS IN SHASTA VIEW AND MALIN DISTRICTS

*Shasta View.*—As previously indicated, the difficulties in Shasta View district are not due to the inability of the land to produce sufficient income to carry the present irrigation and other necessary costs. While the income from the farms visited has been relatively low, none of them are yet really established in irrigation farming. Less than one-fourth of the area has yet been irrigated.

Furthermore, present difficulties are not the result of excessive payments due the Government.

The immediate trouble is, of course, brought about by lack of settlement. Some have not paid irrigation district assessments and taxes because unable to do so. Others have defaulted because of the conclusion that some form of readjustment is inevitable. The general liability of all lands in the district for the indebtedness and operating expenses and for the Government payments has loomed as an insurmountable burden to those undertaking to obtain a foothold, particularly to the newcomers.

The irrigation system as built is a costly one to operate. While this does not yet show in the form of actual operating expenditures, it is sensed by many of the landowners and recognized in the reports made by the assistant State engineer. The sandy nature of the soil and the small ditches are conducive to heavy transmission losses. These are greatly increased in proportion to the area irrigated because the farms now receiving water are scattered, water being conveyed considerable distances to irrigate one or a few farms. Some land is not yet served by ditches, especially in the eastern end. High pumping lifts, particularly under the relict canal, are recognized as an obstacle. Furthermore, it is concluded that the existing pumping plants will not deliver the quantity of water needed and that 2 acre-feet of water per acre could not be supplied.

The investigator feels that present efforts of the State engineer, the bondholders, and the district to readjust their financial structure are commendable,

but he is convinced that they are not going far enough toward insuring an economically sound project.

In the judgment of the investigator the first step now should be an entire reconsideration of the design of the irrigation system with a view to eliminating areas which it will be uneconomical to irrigate, due to high pumping lifts, the nature of the soil or the topography, and the long, small ditches that have been built to serve relatively small areas, particularly in the eastern and western ends. It seems to be very desirable that the Bureau of Reclamation, with the State engineer cooperating, should do this. Until it is done, the investigator feels that all of the facts on which a readjustment of the outstanding indebtedness and the Government contract should be based will not be available.

In their plea that the public notice fixing 3,856 acres as the irrigable area be withdrawn and a lesser area substituted, the district has had in mind elimination of the land west of the Frank Paygr farms and east of the SW.  $\frac{1}{4}$  of the SW.  $\frac{1}{4}$  of sec. 34 and some of the blow-sand area near the Shasta View School. In general this seems to be desirable, but the resurvey proposed is needed to determine this finally. This in general is what the assistant State engineer suggests throwing out, but, as previously shown, he would add elsewhere to make 3,800 acres.

If the bureau, after restudy of the physical system, concludes that a new contract with the district is necessary, the terms of payment to be required will presumably be those that would have been imposed had a smaller area been decided on originally, plus the cost to the United States of enlarging Adams Canal in excess of the capacity that would be required under the revised system, unless this excess capacity is usable elsewhere on the project. With this cost determined, the total additional construction charge to be imposed, particularly that represented by the outstanding bond issue and any expense that may be involved in redesigning and reconstructing the system, should obviously not involve an annual charge for water, including maintenance and operation costs, in excess of the capacity of the land to pay. An annual charge of about \$6 per acre would seem to be a maximum, at least until the earning power of the land is established above that figure. The different elements of such a charge for the first five years from date of the existing Government contract would, it is believed, be about as follows, assuming a 2,000-acre district and continuance of present Government charges, but without allowance for liquidation of outstanding warrant indebtedness and back charges due to the United States:

(All items increased 15 per cent to allow for anticipated irrigation district delinquencies. Items for power and for district maintenance and operation and miscellaneous are estimated from the 1928 budget of the districts, which is based on experience, with an arbitrary small amount for depreciation.)

	Per cent
United States construction charge.....	\$0.391
United States maintenance and operation charge.....	.989
Electric power.....	1.725
District maintenance and operation and general expenses.....	2.300
Available for bond interest and principal and other purposes.....	.595
Total.....	6.000

It is believed that the bonds for which the revised district would be liable should be refunded on such a basis as not to require a charge in excess of the above. If electric power and district maintenance and operation and the anticipated delinquencies can be kept below the figures given, there will be that much more available for bond interest and principal and other necessary items.

The proposal above, of course, has nothing to do with any settlement the bondholders or other creditors may make as to the lands which would be excluded from the benefits of the Government contract. However, in order to avoid future complications from delinquencies of lands to which water is not available, such lands should be excluded from the boundaries of the district if and when that can be legally accomplished.

The successful settlement of Shasta View district will, of course, not be accomplished by the measures above recommended, although they should make successful settlement possible. The excess demand for lands in Tule Lake at

each Government opening is evidence that Klamath Basin is attractive to new settlers. In a resolution dated January 5, 1929, the Klamath Realty Board stated that if individual liability for outstanding district bonds is substituted for the present blanket liability, the board will encourage and direct its special efforts toward colonization. It is believed that this board would be even more ready to assist in colonization if the measures herein recommended were to be carried out.

**Malin District.**—This district has not yet been confronted with an acute financial problem; it is not even entirely fair to suggest that it may be. The reason is the more compact areas, the lower maximum pumping lift—on the low line it is 25 feet, on the high line 52 feet—the more rapid settlement, and the fact that a company financially able and disposed to maintain the district solvent holds a controlling interest in the land. Furthermore, these same interests have \$80,000 of the \$89,100 of irrigation-district bonds that are outstanding. With their land interest and these bonds, their concern in a successful outcome is obvious. They are in a position and are disposed to make any financial adjustment which the situation might come to demand.

Just now, as has already been stated, the principal problem is settlement. The key to this is not merely more people desiring to purchase farms, but people with the requisite capital to attain success. The investigator is optimistic that they will be found within a reasonable time and believes that the quickest way to accomplish this is along the line now being considered by the principal land-owning interest referred to, viz., to extinguish the bonded debt on land which they still hold for sale and thus deliver land with substantially a paid-up water right other than the Government building charge, and also, of course, except annual maintenance and operation and future betterments costs. Such an arrangement should strongly appeal to purchasers, if the practical difficulties involved can be worked out satisfactorily. If they can not, and perhaps also for the benefit of those who own independently of Klamath Lake Land and Live Stock Co., the present bond issue ought to be refunded to extend the maturities. There is too much land which has not yet established its earning power to have bond principal payable now. At least another 5-year period free from bond principal payments would seem to be desirable. What would most be needed is a more definite and more active effort to find buyers who can qualify. The investigator is unable to suggest any new methods of proceeding in that direction.

#### SUMMARY AND CONCLUSIONS

(Following Economic Survey Form 32260)

1. These districts have not yet been operating a sufficient length of time to permit answering this question satisfactorily. Shasta View district has accomplished something, Malin district more. It is hoped that the suggested readjustments in Shasta View would make it a project that will justify itself; construction of Malin district has already been justified.

2. Shasta View district should be readjusted to eliminate areas that will be too costly to irrigate and its bonded indebtedness refunded to postpone principal payments and reduced to the extent necessary to keep the annual irrigation charge to not more than \$6 per acre until the earning power of the land has been built up to justify a higher figure. It should never, however, go very much above this. Lands withdrawn from the benefits of the Government contract should be excluded from the district boundaries. Initial maturities of the Malin district bonds should be postponed at least another five years, unless another arrangement, under consideration by the principal bondholders, is made for lessening the annual bond payments.

Settlement needs to be energetically stimulated in both districts.

The agriculture of both districts is based on forage crops and livestock, with potatoes, alfalfa seed, and clover as the main or most promising cash crops. Alfalfa and farm pasture are the chief forage crops. Dairying and poultry raising are promising, the former now having a satisfactory outlet in a cooperative cheese factory in Malin.

3. With some exceptions in Shasta View district, the land is sufficiently productive to justify settlement. The unproductive land should be eliminated.

4. Delayed settlement has been due mainly to remoteness, lack of capital on the part of settlers, and relatively high water charges.

5. Present irrigation payments are not being met in Shasta View district, and the district is now without water. Delinquencies in Malin district are

more than they should be and have prevented payment of the installment of bond principal due July 1, 1929. The present payments due the Government are relatively small in both districts and are not the cause of difficulty. Total irrigation payments, while high, should be met from the earnings of well-established farms following the best farming practice. Few, however, are yet well established.

Nothing is now being done in Shasta View district to stimulate settlement, other than readjustment of finances and foreclosure of all tax delinquents. Proceedings to accomplish foreclosure are expected to result in redemption of most of the land or at least of a large proportion of that within the limits of a revised project. Malin district is settling slowly.

It is not recommended that the Bureau of Reclamation acquire tax-deed land in either district. This is the proper responsibility of the districts or of those who have sold land under contracts. Both districts should become active colonizing agencies, at least to the extent of selected advertising and organization of all neighborhood interests toward that end, and cooperation with commercial interests in Klamath Falls.

6. Some small additional construction expense may be necessary in Shasta View district if the irrigation system is revised, as suggested.

To furnish the proper basis for refunding of outstanding bonds of the district and, if possible, also outstanding warrants, the Bureau of Reclamation, cooperating with the Oregon Reclamation Commission, through the State engineer, should restudy the physical works of the district and the boundaries and do what can be done to make the project feasible. No objection is seen to adding the cost, if necessary, to the present Government construction charge, in view of the Government investment already made. This, however, should be conditioned on the willingness of the bondholders to refund on a basis that will keep the annual irrigation charge for all purposes to approximately \$6 per acre, including anticipated delinquencies. This charge, however, is so near to the economic limit that the result can not be predicted with more than hope.

7. From \$8,000 to \$10,000 is needed to purchase an unimproved farm of 40 acres, equip it, and bring it to full production.

A competent, reliable, and experienced settler may be able to get a start with \$2,500. With this, credit would be required for purchase of dairy cows or other income-producing livestock and for personal requirements, both of which are available at the local bank to good business risks at 8 per cent to the extent of available resources, and at banks in Klamath Falls. Some loans were reported from the bank in Merrill, about 5 to 10 miles from the districts, and from a local stock-loan association organized under the intermediate credit act. Some loans by the Federal land bank were reported in several other units of Klamath project, but not in these districts.

8. Loans on the land are not available and can hardly be expected under existing conditions, particularly in Shasta View.

9. Presumably the present county agent is in position to supply agricultural advice as called on. Expert assistance in preparing land for irrigation and the use of water would be helpful. The districts are not large enough to justify a special Bureau of Reclamation agricultural and irrigation specialist, although his services could be very profitably employed part of the time if one were available on the main project.

Responsibility for collection of the amounts due to the United States now, of course, lies with the districts. No change in this is recommended.

10. Turning over these district projects to the State is not considered to be needed, although its assistance is. The Oregon Reclamation Commission, through the State engineer's office, is now undertaking to help Shasta View district refinance. The question in the schedule is hardly applicable here.

11. It is believed that the Bureau of Reclamation should not enter into "Warren Act" contracts until it is satisfied by its own investigations that the contracting projects are physically and economically sound. Doing so is likely to be equivalent to Government indorsement of infeasible projects. Furthermore, it endangers the reclamation fund and encourages speculation. The Bureau of Reclamation should also have sufficient control over the construction of projects under "Warren Act" control to protect its interests under such contracts. It is not seen how the Government can escape a certain degree of responsibility for success when it enters into these contracts.

## HORSEFLY IRRIGATION DISTRICT, OREG.

(By William F. B. Chase, Secretary)

## HISTORY

(a) In the year 1905 the Oregon State Legislature granted to the United States Reclamation Service a blanket appropriation for all the unappropriated waters of Bonanza Big Springs and the Lost River Basin, at which time the Government contemplated the use of such waters for that portion of the Klamath project known as the Upper Klamath project. Certain preliminary surveys were made of the Horsefly district which at that time included all of the present Langell Valley district as well as the present Horsefly district, and subsequently the Clear Lake Dam was built for the purpose of storing water for the lands south and west of Lost River, and also by storing this water at Clear Lake Reservoir they reclaimed a portion of Tule Lake or Rhett Lake. This Clear Lake Dam and Reservoir was built about the year 1910 or 1911.

There were negotiations for several years by the old Horsefly district, which included Langell Valley district, and because the people of the upper portion, as well as some of those around Bonanza, considered the proposed construction price of \$65 per acre too high, they did not complete any contract with the Government for Government construction.

The landowners of the upper portion of the valley (Langell Valley) withdrew from the organization, and in the year 1917 the remainder and reduced area now known as the Horsefly Irrigation district decided to go ahead with the bond authorization and put in our own system by means of pumping from Bonanza Springs and the natural flow of Lost River.

So far as the present Horsefly district is concerned there has not been any investigation other than the old preliminary estimate for construction, and hence no contracts for construction except for water that was flowing naturally down Lost River until the year 1923, when Langell Valley district finally decided to have Government construction. The Horsefly irrigation district then entered into a certain joint construction contract between the Horsefly and Langell Valley and United States Reclamation Service whereby we secured a water right for our Horsefly lands to the extent of water for 4,532 acres in addition to the 5,900 acres supply from Bonanza Big Springs and Lost River. I also wish to state that it has always been in the mind of the landowners of the present Horsefly Irrigation district that when the Horsefly Reservoir should be built that they could then make arrangements to supply the north and east side of Lost River lands from this reservoir by gravity for said Horsefly Reservoir (now Gerber Reservoir).

This district was originally named Horsefly, because we contemplated taking water from the Horsefly Reservoir (Gerber Dam). We now have the name, but nothing to do with said storage. The Government did nothing in the way of building ditches for anybody up in this part of Klamath County until about the year 1922, when they began putting in the new Langell Valley Irrigation district, except, of course, the construction of the Clear Lake Dam, the World War being largely the reason for the delay.

(b) There were no contracts between the Government and the Horsefly district for construction until the joint contract with the Government and Langell Valley district above referred to.

(c) The lands were principally held in private ownership, there being only a few acres of Government land, held for the Carey Act; and this land being entirely in the present Langell Valley district.

(d) Settlement on these lands within the Horsefly district was already made, and most of the land was held in private ownership for many years prior to all this irrigation episode, and was being dry farmed and ranged to death in larger holdings. There was some impetus to settlement and some division of larger holdings in our Big Spring unit, unit 1, unit 2, and unit 3. Private lands sold for as high as \$40 per acre in 1920 and as low as \$10 per acre, according to location and superficial conditions. Since then there has been a lowering in land prices for raw land and a corresponding increase in values of improved lands, some being sold for \$100 per acre.

(e) Irrigation began on a portion of this district in the year 1919. The charges for construction, on the start, included only bond interest and water

contract charges to about \$1.50 per acre and operation and maintenance charges to about another \$1.50 per acre. In 1922 we began to levy for bond principal payments, which raised construction costs to \$2 per acre on the land then under irrigation.

(f) The record of payments has been good until about the year 1925; they began to drop off, and it has been a case of close figuring to keep up with our payments, principally because of idle acres.

(g) Only once has the district sought to amend its water contracts and that was in the case of our joint contract for Clear Lake water, and on the grounds that spreading it over a 40-year term instead of a 20-year term it would make our per acre per annum for water contract less. Then, too, this was the same rate which was given to Langeli Valley; that is, to the term of payments.

(h) This is the only amendment, and so far as our contracts for water and the price and terms thereof, there is no complaint. They are fair enough, but there would have to be some switching of water rights to enable us to take water now from Gerber Reservoir by gravity, as gravity water from Clear Lake Reservoir would not be available for any large portion of our lands, while it is now for pumping. It is this pumping that we wish to get away from as far as possible, and also our bonded construction and interest charges, which are all payable within the next 14 years. Our per annum charge being now around \$5 per acre, conditions will not warrant much over \$2.50 per acre per annum in this country.

#### PRESENT ECONOMIC AND AGRICULTURAL CONDITIONS OF DISTRICT

(a) Three-fourths of the land now held by people who live here, but in two large tracts, many are not able to put their whole acreage under cultivation and some turn the water out on native grasses among the sagebrush in the attempt to recover a portion of their tax money. This helps them in the item of pasture, but is not an ideal way to get results.

I attach a list of the nonresident owners hereto.

(b) The total irrigable area for which we have water contracts is: 5,900 plus 4,532 equals 10,432 acres.

Alfalfa, average yield 3½ tons, at average price, \$10-----	\$35
Potatoes, average yield 100 sacks, at average price, \$1-----	100
Wheat, average yield 12 sacks, at (the Lord only knows)-----	20
Oats, average yield 15 sacks, at average price, \$2-----	30
Barley, average yield 15 sacks, at average price, \$2-----	30
Rye, average yield 10 sacks, at average price, \$1.50-----	15

(c) Clover seed is raised successfully in small tracts, but I have not sufficient statistics to give information accurately. There should be and will be more such seeds raised.

(d) The land could be raised at least 30 per cent in productivity by better farming in the way of rotation of crops and more help in working the land, so that each acre would get better attention.

Our farmers can not resist the temptation to farm all the land that they possibly can, and do it without hiring farm labor, which is high, largely because of more attractive wages in the lumber industry.

(e) The character of cultivation has been covered as above; that is, it is not the best, not on account of ability or inability of our farmers, but because of general economic conditions.

Facts relating to resident farmers as follows:

(a) For the most part our farmers are capable and experienced in farming under dry ranch conditions—raising stock, and producing butterfat and dairying; sheep raising, lambs and wool, etc. They have, for the most part, learned all that they know about irrigation right here on the ground in this district. It is the general mind of all resident farmers to give attention in the future to raising of plenty of permanent pasture and just hay enough to feed what stock they can keep on the farm, and sufficient grain for the hogs, chickens, and other animals that the ranch will support. In other words, livestock is the game for this locality.

(b) First cost of farm? This question can be answered only as to a general average, because this district has been built up on the unit plan, the units of which have come under irrigation from time to time, beginning in 1919, and the last unit the dairy unit, received water in 1926. The average

cost is about \$20 per acre, and, assume the average unpaid irrigation costs of about \$25, the average farm carries a mortgage loan of \$10 per acre, the greater portion of such loans being held by the Federal Land Bank, of Spokane, at  $5\frac{1}{2}$  per cent. Some are in the State Land Board, of Salem, Oreg., at 7 per cent, and some in joint-stock land banks at 7 per cent. Some of the improved farms in the older units have a loan value of \$40 and can borrow thereon \$20 per acre; the term of payment is around 30 years with the Federal agencies, and the State loans 10 years, with the privilege of renewal, in the case of the land board, while the World War Veterans' State Aid Commission have loans for about the same term as the land bank, but at  $4\frac{1}{2}$  per cent.

(c) This question is pretty well covered in the above answer; there is remaining only those instances of unpaid taxes on which the interest is 12 per cent, and some of our farmers have livestock loans of which I am not able to report only approximately—about an average of \$500, secured on chattel mortgages.

(d) The average residence farmer has a 5-room dwelling house of frame (wood) construction, value \$1,200, garage \$200, cellar \$200, barn \$500, and machinery for farming 160 acres valued at approximately \$1,000.

(e) The average resident farmer does not need credit if he could dispose of his surplus holdings and have more favorable charges per acre per annum for irrigation. Those who might come in to farm this land would need credit unless they came with funds to finance themselves while getting their land ready for revenue. The livestock and dairy farming is now being practiced by resident farmers to the best of their ability under the conditions, and no changes are desired or advisable other than securing more people to work the land and more favorable terms on water payments. This reduction would permit the amount saved thereon to be invested in livestock, equipment, and further improvement.

(4) The most suitable size of holding in this district for the average farmer in the livestock business, including dairying, etc., would be 160 acres, of which he should seed to permanent pasture grasses about 80 acres and diversify the rest into such crops as may prove the most profitable. When thus handled, so that the farmer would not have to seed more than 75 acres annually, one man could handle this much after he gets shaped-up for it. Ten-acre tracts would be all right for laborer home sites, where one could keep a few cows, chickens, and pigs for their own use, and a little side money, the man having part-time employment in our sawmills and box factory.

(5) Raw land right near Bonanza can be had for \$30 per acre, and a mile or so out for \$20, while further out it may be had for \$10. In all cases the purchaser assumes the unpaid balance of irrigation obligations.

(6) There has been no great demand for land since 1925, and no cash sales to speak of except right near the town in small tracts for home sites. There has been a number of trades made during the last year, some of which brought better farmers and were helpful to the district, and other trades took away some of our good farmers, and this land is not being properly worked. The net result of such tradings have left the district just about where it was. Owners of land would not be above to advance capital for improvement; the only help they could extend would be a fair amount of credit on the purchase price of land. Local capital has already invested itself to about the capacity thereof in the development that is already here. Nearly all of our bonds are held by people who live in Klamath County.

(7) Cost of developing new land? For the most part the new land available would be those lands farther out, which are still in sagebrush.

(a) These could be had at first cost of \$10 or \$15, equals-----	\$2,400
(b) Cost of leveling and ditching and clearing, \$10-----	1,600
(c) House, barn, garage, cellar, poultry house, sheds, and fencing--	2,500
(d) Farm machinery-----	1,000
Total for 160 acres-----	7,500
(a) An 80-acre farm would cost:-----	1,200
(b) Cost of leveling and ditching and clearing, \$10-----	800
(c) House, barn, garage, cellar, poultry house, sheds, and fencing-----	1,750
(d) Farm machinery-----	750
Total for 80 acres-----	4,500



(8) Credit available: If by this is meant the credit that would be extended to individuals in development of their holdings, I do not have positive knowledge of any such at the present time under present conditions. The Federal Land Bank does not wish to loan money for this work, where the per annum charges for irrigation are so high, but I think that they would if they had assurance that this could and would be changed so that the borrowers would be certain of making their installment payments. I do not know of any private lending agencies that are putting out money for farm operations, either here or elsewhere. However, I feel certain that capital is looking for a job, and if it can be assured of its return on investment capital will be available for this industry the same as others.

(9) Klamath Falls and Klamath County can take our butterfat output for some time to come, and San Francisco and Portland handle our beef, pork, mutton surplus, while our wool is usually purchased by Boston buyers. Our surplus hay crop finds a good market, usually at home, for hogse food in the lumber camps and road-improvement work; also, the range sheep and cattle feed around here in wintertime. There is a good demand for hay.

(10) Transportation facilities: Since the year 1925 there has been great impetus to road building and we now have good roads for the greater portion of our county. State highways, market roads, and county roads reaching every settlement and in pretty good shape. We have also the Southern Pacific and Great Northern into Klamath Falls, and the O. C. & E. from Klamath Falls to Bly, which passes us at Dairy on the west, about 7 miles from Bonanza, and this point is our railway loading station. These are favorable for rapid development.

(11) Financial obligations:

Outstanding bonded debt, at 6 per cent interest-----	\$125, 600
Payable as follows:	
July 1, 1929 (paid)-----	\$3, 000 (123, 600)
Jan. 1, 1930-----	8, 700
July 1, 1930-----	2, 000
Jan. 1, 1931-----	8, 700
July 1, 1931-----	1, 700
Jan. 1, 1932-----	8, 900
July 1, 1932-----	800
Jan. 1, 1933-----	9, 000
July 1, 1933-----	900
Jan. 1, 1934-----	8, 500
July 1, 1934-----	100
Jan. 1, 1935-----	7, 600
Jan. 1, 1936-----	7, 800
Jan. 1, 1937-----	9, 000
July 1, 1937-----	500
Jan. 1, 1938-----	9, 000
July 1, 1939-----	300
Jan. 1, 1940-----	9, 000
Jan. 1, 1941-----	9, 000
Jan. 1, 1942-----	9, 000
Jan. 1, 1943-----	5, 000
Total-----	127, 600
Less amount (in office safe unsold)-----	2, 000
	125, 600
Less amount paid July-----	3, 000
Net amount outstanding-----	122, 600

United States contract obligations as follows:

First contract, balance due \$18,876, payable in 22 semiannual installments of \$858 each. This contract was for irrigation water and construction for 4,200 acres.

Third contract for water and construction, balance due \$8,580, payable December 31, 1929; two payments, June 30 and December 31, \$300; balance payable in 28 installments of \$292.50 each, \$8,190.

The second contract for 2,100 acres and the fourth contract for 2,432 acres additional was amended to one contract for 4,532 acres, payable as shown in

the following statement, and is known as the joint contract with United States Reclamation Service, Langei Valley, and Horsefly irrigation district.

The total original obligation of this joint contract was----- \$115,786.31  
On which we have paid two installments of \$1,157.86 each----- 2,315.72

Balance to be paid----- 113,470.59

First 8 payments of \$432.20, June and December----- 3,473.60

Next 20 payments of \$1,157.86, June and December----- 23,157.26

Next 50 payments of \$1,736.79, June and December----- 86,839.73

Total, 78 payments in 39 years----- 113,470.59

Summary of Government obligations:

Balance to be paid on first contract----- \$18,876.00

Balance to be paid on third contract----- 8,580.00

Balance to be paid on joint contract----- 113,470.59

Total of water construction contracts----- 140,926.59

We are also obligated to pay to the Government a perpetual operation and maintenance charge of 8 cents per acre on 5,900 acres embraced in the first and third contracts and the actual cost of operation and maintenance on the joint contract for maintenance of the Clear Lake Reservoir, which amounts to about \$200 per year.

Our average annual payments to the Government are:

Construction----- \$0.30

Operation and maintenance----- .08

Annual bond-retirement fund----- 1.00

Annual interest fund----- .75

Total bond and contract fund levy----- 2.13

Plus 10 per cent for estimated delinquencies----- .22

Total----- 2.35

Our average annual operation and maintenance as follows:

Overhead and administration----- \$0.32

Power for pumping----- 1.00

Pump tenders and operation and maintenance of pumps and motors.. .10

Ditch tenders and operation and maintenance of ditches, flumes,  
etc----- .15

Total----- 1.57

Plus 10 per cent for estimated delinquencies----- .16

Total operation and maintenance expense----- 1.73

Total per acre annual charge----- 4.08

The operation and maintenance charge will be larger yet when all the lands are using water, because we will have to pump more.

The average State and county tax is about 25 cents per acre.

(12) Our only large creditors are the bondholders and the Government.

I think that the bondholders would impound their bonds for par payment if the Government would take up our present construction and discharge our small bonded debt. The only concession that would then be needed would be on the part of the Government, that it would do the work necessary for this change, add this cost to our remaining bond cost, and let us pay the whole bill over a term of 38 or 39 years, corresponding with our joint contract for water.

The foregoing is in answer to a general outline of economic conditions of certain irrigation districts as applied to the Horsefly irrigation district, which outline has been sent to us by Hon. R. R. Butler, Congressman, and was prepared by the honorable commissioner, showing what facts and conditions in general should be brought out.

There is a condensed synopsis following, which covers in a condensed form the economic aspects of the Horsefly district.

I have been authorized to make this report for this district by order of the board of directors, and it is made in furtherance of our resolution of May 20, 1929.

Respectfully submitted.

WM. F. B. CHASE,  
Secretary Horsefly Irrigation District,  
Box 116, Bonanza, Oreg.

#### SYNOPSIS OF ECONOMIC SURVEY OF THE HORSEFLY IRRIGATION DISTRICT

(1) Have the economic and social benefits of this project justified its construction?

Answer. Yes. By its construction other development has been accomplished and other irrigation lands reclaimed. The people have been able to acquire farm homes and make a living. It has helped to build good roads and made possible the coming of better rail facilities. It has helped, by having farm produce here locally, to stimulate and lower the costs of logging, milling, and handling of the lumber industry, and has been one of the large items of development of this part of the Klamath Basin. If it had not been undertaken, other projects would not now be built and this portion would still be in sagebrush as a jack-rabbit reserve.

(2) What are its opportunities and what are the profitable crops?

Answer. Its opportunities lie in the raising of livestock and dairying, supplemented by small farming for home sites by employees of other industry. Its profitable crops are hay and permanent pasture grasses, grain, and potatoes, and grass seeds.

(3) How much of the unsettled, undeveloped land is sufficiently productive to justify settlement under present agricultural conditions?

Answer. All of it, provided the annual charges could be reduced.

(4) How far has delayed settlement been affected by—

(a) Defects of soil? None whatever.

(b) Climatic conditions? Perhaps to the extent of 10 per cent, because people do not or have not considered that in this elevation we must confine ourselves to grass crops and hardy plants and vegetables not affected by summer frosts. We have a short, rapid growing season, which insures good crops of this character if people would only not try impossible things. Peaches and pears are not a success in these parts, but berries are grown by many people, and are of fine quality.

(c) Remoteness from developed communities and lack of markets? None at present, but there was some hindrance at the start. There is a good market for everything that we can raise, at prevailing prices, but these prices, especially for potatoes, could and perhaps will be better.

(d) Lack of capital on part of settlers? This feature, where it has affected anyone, has prevented his going into the business altogether, which would be 100 per cent. It has affected the resident landowner in his own operations to about 50 per cent; that is, he could have done twice as well if he could finance his undertakings at reasonable rates.

(e) Water charges? Those have affected settlements the last four years to a large degree; perhaps 50 per cent of prospective purchasers have been scared away by water charges.

(f) Local taxation? This is not very high when we consider the benefits from good roads, schools, and public service. I hardly think that this item has kept anyone from settling here, and our schools have brought people into this locality.

(g) Lack of credit? This lack of credit is closely connected with the question of capital, above answered; however, I might add that all credit is founded ultimately on faith in the ability of the irrigationist to pay, and lately there has been little such faith in evidence, not only in matters relating to the irrigation farmer but also all farming. It has affected this district in the sale of bonds and in getting the work finished as soon as it should have been to enable the present landowners to work their land, etc. This lack of faith in farming has affected all. I can not say how much. The rest of the people do not seem to realize that the farmer is a customer for other industries.

(h) Health conditions? Insect pests and plant and animal diseases? Health conditions are good, and this community is not bothered with insect pests or animal diseases.

(5) Can the irrigation payments required under present conditions be made by the people now on the project?

Answer: The people now on the project can just barely make their own payments on their own land, but this is not sufficient. The payments on the unoccupied land must also be made. This land must be put to work under conditions which will insure full payment for all charges.

What is being done in the way of settlement of delinquent lands?

Answer: We, the district, are foreclosing on such delinquent land, taking title to same, and will sell to prospective settlers at a reasonable rate. This will not take place very rapidly unless we can assure settlers of a reduced acreage charge per annum.

Should the Bureau of Reclamation be given authority to acquire title to land through purchase of tax certificates and thus become an active settlement agency?

Answer: No. I think it would be better to let the district take title and sell to purchasers direct in the case of this district. There would not be enough of such business to justify the business involved.

(6) If more construction work is asked by the project water users, what will it cost? Is it needed and will it be paid for in accordance with the reclamation act?

Answer: In order to get gravity water for the lands on the north and east side of Lost River the following ditch changes involving additional construction would be necessary:

First, a new ditch would have to be built from the present Laugell Valley North Canal down to the Big Springs pumping plant, and then our present Big Springs high-line ditch running west would have to be enlarged to carry 67 second-feet around to the beginning of the Dairy-Yonna Canal of the Horsefly district. Our engineer estimates that this can be done for \$67,000. Then the north canal of the Laugell Valley district would have to be enlarged to carry this extra water, or else their high-line ditch, which is not yet built, could be now constructed jointly with our added requirements, and accomplish the same or better results in that it would be easier to handle in administration and also it would obviate the making of a deep cut for use on the McCombs ranch. I do not know how much this or these changes would cost, but I should think that our portion would not cost more than \$65,000, or about \$132,000 for a complete delivery change for us from the diversion at Miller Creek to the connection with the Dairy-Yonna Canal.

There would have to be some switching of water rights, as we would then be using more stored water and less of the natural flow of Lost River and the Big Springs, but inasmuch as we should have credit for what we have already paid on these waters, our net additional cost on account of water alone should not be very large, as this surplus water that we would give up would take the place of stored waters that are used below here on the Tule Lake lands and other lands of the Klamath project.

While the district is making this change there should be some more work done on our Buck Creek drain, and two or three smaller drains that need deepening and dredging out, perhaps to the extent of \$8,000.

Then some of the larger pumps from the north side of Lost River should be moved over to the south side of Lost River to supply 3,732 acres remaining in units 1, 2, 3, 4, and Bunnell lands.

A larger canal to connect up unit 2 and the Bunnell unit should be constructed for one of these pumping plants with a bigger pump and higher delivery, as the Bunnell unit has never been fully completed for higher delivery to upper lands; this would cost for ditch only about \$2,000, and moving and installing pump \$500.

One of the present Dairy-Yonna pumps, the 100 horsepower, should be moved to the Lytle Horn unit No. 3. The cost of changing pumps would be only \$500. As we have all the pumps and pipes here available, there would be no new pumps to purchase.

## Summary of estimated total costs:

On account of gravity north of Lost River.....	\$132,000
Improvements of drainage facilities.....	8,000
Improved ditch for unit 2 and Bunnell unit.....	2,000
Changing pumps in same.....	500
Changing pumps in unit No. 3, Lytle unit.....	500
<b>Total additional costs.....</b>	<b>143,000</b>
Plus price of our unpaid district const (bond debt).....	122,600
Plus our present water contracts.....	140,536

**Total estimated cost of district after change..... 406,136**

I am estimating the new water costs on the basis of the old water costs; these might be a little higher, but not very much.

This would make a Government obligation of around \$40 per acre to be paid in 38 or 39 years to correspond with our present joint contract in Langell Valley, and the payments on construction to the—

	Per acre
Government would be around.....	\$1.12
Government operation and maintenance of storage facilities would be.....	.07
Or a total construction charge payment and operation and maintenance to U. S. Reclamation Service of.....	1.20
Our own district operation and maintenance would be reduced to not more than.....	1.00

**Making a grand total for water payments and service..... 2.20**

This change is needed, and it would be paid for as explained in the preceding outline. It would give the land a chance to pay its way, and gave the owner a chance to live and prosper and be helpful to the rest of this country who has cooperated with him in faith for the future.

(7) How much capital is required to purchase a farm of unimproved land and bring it to full production?

Answer: For a 160-acre farm it will cost \$7,500 to bring to production and have a suitable home and improvements. He should have at least \$3,000 for the initial investment and a credit of at least \$2,500.

For an 80-acre farm he should have at least \$2,000 and a credit of \$2,500, for it will cost the small farmer just as much for suitable home and buildings as the larger farmer.

(8) Who should furnish this credit?

Answer: The Federal Land Bank or the auxiliary credits agency should furnish this credit, or go out of the business and let others do it.

(9) The Interior Department should be given sufficient funds for the improvement of farm practices on reclamation-projects lands to insure that farm operations on such lands would be carried on in such way as to insure good practice and best returns, and repayment to the Government of reclamation costs. They should have this fund on the same terms as that given to the Agricultural Department, never to be repaid otherwise, then simply in making this country more prosperous and happy and creating incomes on which we all could pay an income tax.

Men schooled in the general practices of agriculture should be assigned from the Agricultural Department, after acquiring such skill and knowledge, to these labors and paid out of said fund directly by the reclamation commissioner with approval of the Interior Department.

In other words, there should be a cooperative unit between the two departments for this purpose, for the next 40 years, at least.

The Agriculture Department is public teacher and it should teach in any district where the people require, and the wages come from the same source, no matter who hands over the check.

(10) There would be no advantage in turning this district over to the State for development and settlement, but there is no reason why the State would not assist in such settlement through the State chamber of commerce work that is now being carried on.

(11) I have no recommendations as to changes of the laws and practices of the Bureau of Reclamation, other than that in paragraph 9; if a change is necessary to insure good farm practice on irrigation projects, then it should be made.

In the particular case of this Horsefly district, and the old bonds that have to be taken care of, I wish to observe that the reclamation fund would not suffer in taking care of these old bonds, for the reason that there is constructed already ditches, drains, flumes, and pumps paid for that would fully represent a value equal to the outstanding bonds, and the district would repay this bonded cost to the Government just the same as if they had furnished these facilities in the first instance.

### GEM IRRIGATION DISTRICT, IDAHO

(By B. E. Stoutemyer, District Counsel, and W. W. Johnston, Associated Reclamation Economist, Bureau of Reclamation)

#### HISTORY

The Gem irrigation district was constructed as a private enterprise under the district form of organization. The project as originally promoted included the construction of a power plant at Crane Falls, from which it was proposed that cheap power would be furnished for pumping water from Snake River to the lands of the district.

The promoters of the project encountered difficulties in the construction of the proposed dam across Snake River and the power plant was abandoned and the plans modified to provide for purchase of power from the Idaho Power Co. The pumping plants were constructed, however, and canals and laterals built for the distribution of water to the lands of the district.

The pumping lift in this district is a very high one and the project is feasible as a pumping project only in the event that very cheap power can be secured.

The lands under the canals now operated by the district, together with about an equal amount of land lying above the present canals and now included in the district boundaries, can be irrigated by gravity from the Owyhee project. The Gem district as now organized includes practically all of that part of the Owyhee project located in the State of Idaho, approximately one-third of the project. About one-half of the lands now included in the district boundaries lie under the existing canal system and about half thereof above the existing canal system. The district as originally organized was confined mainly to the lands lying under the existing canal system, but the higher lands were brought into the district by petition and consolidation proceedings about the time that the Owyhee project was initiated, in order to comply with the requirement that the payment of the cost of the Owyhee project be assured by contracts with irrigation districts.

Assessments for the payment of the outstanding bonded and warrant indebtedness of the district are chargeable only to the lands included in the district at the time that such indebtedness was incurred, namely, to the old lands lying under the existing canal system.

It appears from early records that the business of the districts was carried on under very adverse conditions, relying on water for irrigation pumped from Snake River, using electric energy furnished by the Idaho Power Co. to drive the pumps. The power charges ran well over \$100,000 a year for several years. Various attempts were made by the district to secure power elsewhere at a cheaper rate without success.

The State of Idaho held about 8,000 acres of land in the heart of the district, a part of which was farmed with water pumped by the district's pumps, and considerable sums of money were lost to the district from the fact that the State land could not be held for unpaid assessments or water charged. Some years later several thousand acres of this land, together with other lands in the district, became seeped to such an extent that it was unfit for cultivation.

When the agricultural slump of 1920 and 1921 struck the district it resulted in many of the settlers leaving their holdings to seek a means of livelihood elsewhere. However, some of the older settlers continued to hold their lands and other settlers came to the district and acquired farms.

In 1923 the district entered into negotiations with the Government with a view to obtaining cheap power to enable the district to continue operation. These negotiations resulted in the suggestion that a power plant be constructed at the Black Canyon Dam and power generated there for the use of the district, and in November, 1924, a contract was entered into between the Government and the district for the purpose of furnishing power from the plant to be constructed by the Government at the Black Canyon Dam.

The appropriation bill passed by Congress providing the funds necessary for the construction of the power plant was made conditional upon the making of a contract under which the creditors of the district should subordinate their claims against the district to the claims of the Government for furnishing such power. The appropriation was also made conditional upon a contract with the district under which the district should pay annually 5 per cent upon the cost of the power plant, a reasonable depreciation charge to be determined by the Secretary of the Interior (afterwards determined to be  $3\frac{1}{2}$  per cent on the power plant and  $5\frac{1}{4}$  per cent on the transmission line), and the cost of operating and maintaining the works.

The district secured such subordinating agreements from over 90 per cent of its creditors and also secured another agreement whereby the creditors agreed to accept the sum of \$350,000, plus some contingent payments, in full settlement of the district's bonded and warrant indebtedness, which amounted with interest at that time to about \$1,600,000. It was contemplated at the time that this agreement was secured from the creditors that the necessary funds might be secured either by the sale of refunding bonds, if that should be found feasible, or by the sale of the district's canal system to the Government to serve as part of the lateral system for the Owyhee project.

It was estimated at that time that the average cost per acre of providing a lateral system in those portions of the project where no existing ditches were available would be about so much per acre as would be involved in the payment of the \$350,000 for the canal system of the Gem district to serve as a lateral system in that area. The option given by the creditors of the district to cancel the \$1,600,000 of indebtedness upon the payment of \$350,000 expires in September, 1929, and it is now apparent that the district will not be able to take up this option.

At the time that the option was secured from the creditors of the district an option was given to the Government by the district, under which the Government was given the right, at its option, to purchase the canal system of the district for \$350,000. It was later decided by the department to reject this option, and the district then made efforts to secure the money elsewhere and authorized the officers of the district to issue refunding bonds for this purpose. The best offer which the district was able to secure for such bonds would net the district only about 60 per cent of the par value of the bonds. It appeared to the officers of the district that a sale of refunding bonds on such terms would not afford the relief required, and it was also thought that the sale at such a price would be in conflict with the requirements of the Idaho statutes.

Contracts were made between the United States and the Gem Irrigation district and the other Irrigation districts of the Owyhee project providing for the construction of the project and the payment of the cost thereof by the districts. In lieu of the purchase of the existing canal system of the district, it was agreed in the contract between the United States and the district that the old lands of this district and of other districts similarly situated would be allowed a differential of \$15 an acre on account of the use of their existing canal system as a part of the lateral system of the project, to wit, the old lands of this district and other districts having rights in existing canal systems which could serve as a part of the lateral system of the Owyhee project would be allowed a sufficient credit on account of such existing canal system to make the charge against such old lands \$15 an acre less than the charge assessable against the new lands which had no existing canals.

The Gem district has been very well managed during recent years, and as a result of the good management on the part of the district officials and the cooperation secured from the State and Federal Government the district has been able to solve several of the most serious difficulties which confronted the district at the time that its power contract with the Government was made.

The district has met its payments to the Government very promptly and without default, and for this purpose has levied and collected a higher operation and maintenance charge than any other Idaho district which is under contract



with the Government. The amounts paid by the district to the Government for power were as follows:

1926-----	\$42,000.00
1927-----	46,529.61
1929-----	46,331.14

At this rate the Genie district will have paid to the Government the total cost of the Black Canyon power plant in about 12 years.

The natural flow of the Fayette River is insufficient during August and September in low-water years to operate the Black Canyon power plant to a sufficient capacity to supply the full requirements of the district, and on this account the district secured supplemental power from the Idaho Power Co. in 1926 and 1928 at a charge of \$17,027 in 1926 and \$13,226.30 in 1928. It is understood, however, that the district claims an offset against the power company which will cancel a large part of this indebtedness for power furnished by the company in 1926 and 1928. Under the Idaho law power plants used in part for furnishing power for irrigation pumping are exempt from taxation as to the proportionate part thereof used for such irrigation purposes, provided that the amount of such tax reduction or rebate is applied as a credit on the bills of the users of the irrigation power, the theory being that such portion of the power plant used in furnishing power for irrigation and the power used in furnishing the necessary water for irrigation purposes constitute a part of the water right and therefore are already taxed as a part of the value of the irrigated lands supplied with water in this manner, and therefore should be exempt from taxation on the same theory under which irrigation canals are exempt from taxation under the Idaho law.

The power furnished by the Idaho Power Co. in 1926 and 1928 was furnished under the terms of the 3-party contract between the United States, the district, and the Idaho Power Co., under which the power company is obliged to furnish surplus power to the district when needed by the district, provided the company has such surplus power available and not required for other use. Under the terms of this contract, where the company has a power plant or plants available which are not being operated, the district is entitled to power from such plants upon paying the cost of operating the same. This is understood to be the basis upon which the charges of the Idaho Power Co. were made against the district in 1926 and 1928.

The power company now has a connecting line between its Idaho system and the system of the Utah Light & Power Co., by means of which the surplus power of the Idaho Power Co. can be transmitted into the Utah territory. This interconnection is likely to eliminate the availability of surplus power on the system of the Idaho Power Co.

The menace of a possible power shortage and resulting water shortage in the district will be removed, however, upon the completion of the Deadwood Reservoir, which is expected to be available at the beginning of the irrigation season of 1931. Upon the completion of the Deadwood Reservoir the Black Canyon power plant can be operated to full capacity throughout the irrigation season and will be able to provide about one-third more power than is required for the needs of the Genie district, and this power can be furnished then to some of the pumping districts in the Oregon portion of the Owyhee project, and the payments secured from this source would tend to reduce the amount required to be paid by the Genie district to provide the 5 per cent of the cost of the power plant, the  $3\frac{1}{2}$  per cent and  $5\frac{1}{4}$  per cent for depreciation, and the cost of operation and maintenance of the power plant.

The charge for power from the Government power plant is about one-half of what would be required under the power company rates, and this reduction in the cost of power has enabled the district to continue operation and to make some progress in solving some of the most serious difficulties of the district. Great credit is due to the district management for the progress which the district has made in the solution of several of its most serious difficulties, among others the drainage problem which threatened a large part of the lands of the district and the no less serious problem presented by the existence of 8,000 acres of untaxable State lands in the heart of the district.

#### DRAINAGE

The drainage work done by the district has been carried on on a cash basis and at a remarkably low cost per yard of excavation. The drains have proved

very successful in draining the land, and about half of the required drainage system has now been completed. The remainder of the required drainage works can be constructed by the district in the same manner, and the district is proceeding with this work at a rate which will complete the drainage system before the gravity water becomes available from the Owyhee project. In 1924 there were a little over 12,000 acres in actual cultivation in the district. During the next few years the encroachment of seepage conditions became so great that some 5,000 acres were in danger of being abandoned on that account, which would soon have resulted in depriving the district of revenue to such an extent that it would have been impossible to continue to operate.

The district has acquired considerable land by virtue of tax deeds and otherwise, which it put upon the market, with the result that it secured enough money to enable it to purchase a dredge and begin drainage operations. The Government cooperated by selling a used dredge to the district at the book value (cost less depreciation). This dredge, being available on the Boise project and in good condition, was secured by the district at a lower cost than would have been possible if the district had been obliged to purchase a dredge and ship the same in from some other source.

The actual digging of drainage canals was begun in the fall of 1926, and since that time 24 miles of drainage canals have been constructed. The district report that this required the excavation of 1,515,128 yards of dirt at a cost to the district of \$70,260.80, or 4.6 cents per yard, and resulted in the reclamation of 5,100 acres of land. This is a remarkably low cost per yard and indicates good management and strict economy.

The drains constructed by the district, in addition to reclaiming and protecting the lands under the district canal system, will also provide outlet drains, when the same are later needed, for the higher lying lands in the Owyhee project which are not now irrigated. A flow of about 50 second-feet of water has been developed through the drainage ditches, which is being used for the irrigation of the lower lying lands of the district. The district officials believe that on the completion of the drainage system sufficient drainage water will become available to furnish irrigation water for about 3,000 acres of land. This will be of material benefit to the entire project in supplementing the water supply from the Owyhee River or reducing the demand upon that supply.

The ability of the district to carry on this drainage work without issuing bonds or incurring indebtedness, and at the same time to make heavier payments to the Government than are being made by any other district in this vicinity, speaks very highly both for the ability and integrity of the district management and the productiveness of the district lands. This district is believed to be considerably above the average, both in the ability of its management and in the fertility and productiveness of most of the lands of the district.

The district proposes to extend its drainage system by the construction of 25 miles more of drainage canals, involving the excavation of 1,300,000 yards of dirt, at an estimated cost of about \$60,000, which it is estimated will reclaim about 5,250 acres of land.

A map of the district showing the drainage canals heretofore constructed by the district and the additional drains to be hereafter constructed is attached to this report.

During the same time that the district has prosecuted the drainage construction referred to above it became necessary to enlarge some of the district canals and to construct new laterals and diversions, replace siphons and flumes, install pumps, and construct crossings, at a cost of about \$40,000. This work, together with the drainage work, has been done without making any special levy or adding to the indebtedness of the district.

On the basis of the cost of the water rights of the Owyhee project the drainage water developed in the drainage canals constructed by the district would be worth more than \$350,000, and will relieve the irrigation works of the Owyhee project from the burden of supplying water for several thousand acres of land. As the lands supplied from this source will contribute toward the payment of the cost of the Owyhee project the same amount per acre as the lands supplied directly from the Owyhee reservoir, this drainage water supply should be of material advantage to the project.

The estimates for the Owyhee project are understood to include about \$1,000,000 for drainage construction on the project, and this cost of the drains to be provided by the United States in connection with the construction of the

project will be paid pro rata by the various districts included in the project, including the Gem district. It would, therefore, appear that if the Gem district pays a pro rata share of the cost of providing drainage for the other parts of the Owyhee project, and also provides its own drainage system at its own expense, including drains available as outlets for the drainage system of the higher lands, and drainage water which will replace water which if furnished from the project works would require an investment of about \$300,000, there will be certain equities in favor of the district which would justify some adjustment in the present contract, either in the way of relieving the old water-right lands of the district from the obligation to contribute to the drainage system to be provided for the new lands of the Owyhee project or in the form of some kind of a credit or adjustment with reference to the district payments. The adjustment later suggested in this report would provide an equitable consideration for the drainage work done by the district at its own expense and the use thereof as outlets for the drainage works to be later provided for the new lands of the Owyhee project and for the use of the water supply developed in the drains constructed by the district.

#### STATE LANDS

The existence of some 8,000 acres of nontaxable State lands in the heart of the district presented another problem almost as serious as the seepage problem. The cooperation of the State has enabled the district to place this land in the hands of settlers who are meeting their water payments to the district and whose lands are subject to taxation upon the same conditions as other lands. The elimination of the 8,000 acres of nontaxable lands is a long step in the direction of putting the district in a solvent condition.

#### LAND OWNERSHIP

The Gem district as now organized includes within its boundaries approximately 50,800 acres of land, of which approximately 26,800 acres is under the present canal system of the district and approximately 24,000 acres lies above the present canal system of the district but under the canals to be provided from the Owyhee reservoir.

Of the 26,800 acres under the present canal system of the district, approximately 19,500 acres are in private ownership, approximately 6,000 acres are owned by the district, 800 acres are State lands, and 500 Government lands. Of the 24,000 acres within the district boundaries above the present canal system of the district but under the proposed irrigation works of the Owyhee project, approximately 9,173 acres are in private ownership, about 7,000 acres State lands, and about 7,800 acres are Government lands.

Not all of this acreage, however, is irrigable. Of the 26,800 acres under the present canal system of the district, the district officials estimate that approximately 17,000 acres will be irrigated, and the acreage now being actually irrigated is understood to be about 14,000 acres.

#### LAND SALE PRICES AND TERMS

Very little privately owned land has changed hands in recent years. Through the cooperation of the State, the district acquired title to most of the 8,000 acres of untaxable State land located in the center of the district and has been quite successful in the sale of this land to settlers, most of whom are local people. The district has sold about 7,000 acres at prices ranging from \$2.50 an acre to \$50 an acre, the higher priced land being land which has been somewhat improved under rental contracts or former sale contracts. The terms of payment were 25 per cent at the date of sale, balance to be paid in five annual installments, beginning two years from the date of sale, with interest on deferred payments at the rate of 6 per cent per annum.

#### SETTLEMENT

The success of the district in the sale of the 7,000 acres above referred to leads the district officials to believe that the new land can be sold by the district organization at from \$10 to \$20 an acre as rapidly as it can be furnished with an adequate water supply.

## OPERATION AND MAINTENANCE

Operation and maintenance charges have been at the rate of \$7.50 per acre per year for the last eight years. Collections have been very good since 1924.

## CROPS GROWN

The principal crops are alfalfa, clover, small grain, corn, and potatoes, the estimated value of crops being from \$30 to \$60 an acre.

## BUILDINGS AND EQUIPMENT

Nearly all buildings are cheaply constructed. Farmers cultivating large tracts of land are usually well equipped with farm machinery, including tractors. The smaller farms are not so well equipped.

## CREDIT

Banks in surrounding towns extend necessary credit to farmers at the rate of 10 per cent interest, if sufficiently secured.

## MARKETS

Market for all hay produced is to be found in the district for the purpose of feeding sheep. Dealers from Caldwell and Nampa send trucks out to the farms to collect dairy and poultry products at fair prices. Wheat is shipped to the Pacific coast markets. Corn and barley are consumed in the district by being fed to hogs. There is a branch of the Oregon Short Line Railroad running the length of the district, providing good transportation facilities. This branch leaves the main line at Nyssa, Ore.

## COST OF PREPARING LAND FOR IRRIGATION

The cost of preparing land for irrigation varies a great deal, depending largely upon the amount of leveling required. The district officials estimate the average cost of preparing land for cultivation as between \$25 and \$30 an acre.

## STATE AND COUNTY TAXES

Farm lands are assessed at about \$30 an acre plus improvements, the tax amounting to from \$2 to \$3 an acre.

## FINANCIAL CONDITION OF DISTRICT

The district has been operating on practically a cash basis during recent years, including the payment of the power charges to the Government, cash payment for drainage construction and replacements, and the operation and maintenance of the canal and pumping plant. This has required an annual operation and maintenance assessment of \$7.50 an acre per year, which has been paid by the landowners in nearly all cases, but is considered to be the maximum which it will be practical for the landowners to pay, and has been too high to permit the average settler to accumulate any resources for the construction of improvements or betterments on the farm or the accumulation of livestock or development of the dairy industry.

The uncertainty as to the financial future of the district has also had a tendency to discourage the investment of any money in improvements except of the most simple sort, even by such settlers as might be financially able to do so. The bonded and warrant indebtedness, with accrued interest, amounts to about \$1,600,000, which is a burden confined to the original or old lands of the district. No payments of interest or principal on this indebtedness have been made for many years, the entire resources of the district being required to meet the required expenses of continuing operation, as above set out.

The district creditors, representing over 95 per cent of the bonded and warrant indebtedness, have agreed to settle for the sum of \$350,000, plus some contingent amounts, if paid before September, 1929; otherwise they have agreed that the indebtedness will in any event be reduced to \$1,000,000. This

is equivalent to about \$25 an acre for the present irrigated area if paid before September, 1929, or about \$70 an acre if not so paid.

Upon the completion of the Owyhee project and the delivery of gravity water the expenditures heretofore made for the purchase of power and for maintenance of pumps will no longer be necessary, but the project construction and operation and maintenance charges will make a total payment requirement only slightly less than the amount now required. It is believed that the annual assessment of \$7.50 an acre which is now being levied is about the maximum that can be successfully collected. This will not leave a margin sufficient to pay any large part of the bonded and warrant indebtedness if the required construction and operation and maintenance payments to the Government are to be met by the district as the same come due. Some adjustment of this district indebtedness is essential to the solvency of the district.

It is also believed that some of the settlers who have been meeting the annual assessments of \$7.50 an acre a year have done so only in the hope that conditions would be better before long. A rate somewhat lower than \$7.50 an acre is considered very desirable to enable the settlers to secure better improvements and needed livestock and equipment.

Enforcement of the payment of the district's bonded and warrant indebtedness in its entirety during the time that payments are being made to the Government under the existing contracts (if possible at all) would result in forcing most of the present settlers off of the land through inability to meet the combined payment requirements, with consequent bankruptcy of the district and much additional cost and delay in resettling the lands.

Some adjustment of the bonded and warrant indebtedness of the district, under which a reduction would be made to an amount not exceeding \$350,000 in place of the present total of \$1,600,000, is believed to be essential to the success of the district. Ninety-five per cent of the creditors of the district have agreed to accept \$350,000 in cash if paid before September, 1929, but the two months heretofore considered as a possible means of providing such payment and wiping out this indebtedness have both been found infeasible. The proposed sale of the district's canal system to the Government has been definitely rejected by the department, and therefore will not be discussed in this report. The sale of refunding bonds has also been found to be impracticable, for the reasons explained above.

As the delivery of water, whether provided by power furnished from the Government power plant or by gravity from the Owyhee reservoir, is conditional upon the payment of the charges due to the Government, the Government charges are believed to be, from a practical standpoint, a prior lien, as the bonds and other securities would be worthless without the water.

The reduction of this indebtedness to reasonable proportions is the principal remaining unsolved problem of this district. As a possible means of solving this problem and also allowing the district some equitable consideration for the use of the drainage system constructed by the district as outlets for the drains of the higher lands of the project and the use of the drainage water developed by the district as a substitute for water which would otherwise have to be supplied from the Owyhee Reservoir, the following plan is submitted.

#### SUGGESTED PLAN OF HANDLING THE FINANCIAL PROBLEM OF THE DISTRICT

The existing contracts between the United States and the various irrigation districts comprising the lands of the Owyhee project contemplate low or nominal construction charges on the new lands of the project for the first five years, but provide for full construction payments from the old lands (now irrigated under the pumping plants) as soon as gravity water is available.

It was thought that during the first five years the resources of the settlers on the new lands would be all required to meet the expense of getting the land improved and into cultivation and paying the necessary operation and maintenance expense, leaving little margin for construction payments. The settlers on the old lands will not have the burden of putting the land into cultivation, but in the case of the Gem district will have an equally serious burden in providing for the payment of the bonded and warrant indebtedness, even if reduced from \$1,600,000 to \$350,000.

As a possible solution, it is suggested that in consideration of the use of the drains constructed by the district as outlet drains for the higher lands of the project, the use of the water supply developed in the district drains as a part

of the water supply of the project, and the equities existing in favor of the district on account of its payment of a pro rata share of the cost of the project, including drainage works for the new lands, while providing its own separate drainage system at its own expense, a supplemental contract be made with the district, allowing the old lands of the district the same privilege of nominal construction payments during the first five years allowed to the new lands of the project, provided the creditors of the district will accept \$350,000 of refunding bonds in lieu of their present holdings and the district will pay each year on its refunding bonds during such 5-year period the amount which it is now paying for power (about \$45,000 per year).

Four per cent interest could be paid on the refunding bonds beginning in 1931, and any part thereof remaining unpaid after 1941 could bear interest after that date at 6 per cent. Four per cent interest on the refunding bonds beginning in 1931 could be provided for in the following manner:

Upon the completion of the Deadwood Reservoir the power output of the Black Canyon plant will exceed the requirements of the Gem district by about one-third. There will be an urgent demand for this surplus power in the Oregon pumping districts of the Owyhee project. If sold at the rates now charged the Gem district (which are about one-half the power company rates), this surplus power would bring in to the credit of the Gem district about \$15,000 per year. This would be just about sufficient to pay 4 per cent on \$350,000 of refunding bonds without increasing the annual assessment of \$7.50 per acre which the district is now levying and which is believed to be about as high as it is possible for the water users of the district to pay.

With the consent of the district, some arrangement might be made for paying the receipts from such surplus power direct to the trustee for the bondholders and other creditors of the district to the extent required to meet a 4 per cent interest payment on the refunding bonds instead of paying or crediting the same to the district, thus increasing the assurance that a moderate rate of interest would be paid on the refunding bonds and perhaps increasing the possibility that such a settlement would be acceptable to the bondholders.

The payments on the principal of the refunding bonds during the first five years after gravity water is furnished would reduce the bonded indebtedness to a sufficient extent so that the interest on the remainder would just about offset the differential in annual construction payments in favor of the old lands on account of the \$15 credit for existing ditches.

Under an adjustment of this kind it is believed the district could meet its various obligations as they come due.

From the standpoint of the bondholders and other creditors of the district, a settlement on the lines suggested above would be considered less desirable than a cash settlement of \$350,000. But as compared to a continuation of present conditions, under which no interest or principal has been paid for many years, it has distinct advantages for the bondholders and other creditors in providing interest payments at a moderate rate beginning in the near future and substantial payments on the principal a few years later.

It is believed that until some satisfactory settlement has been reached between the district and its bondholders and other creditors the present method of furnishing water to the district and collecting for the power furnished should be continued under the provisions of existing contracts, which give the Government a prior right to payment for power furnished to the district, and that no Government money should be expended in the construction of canals for the delivery of water to the old lands of the Gem district until a settlement has been reached with the district creditors which will put the district in a solvent condition. The Government is in a better position to negotiate concerning such settlement before its money is invested in such canal construction than it would be thereafter.

The Gem district is the organization relied upon for the payment of about one-third of the cost of the Owyhee project, and the success of this district will be an important factor in the success of the entire project.

The foregoing portion of this report was prepared by District Counsel B. E. Stoutemyer, but is also satisfactory to Associate Reclamation Economist W. W. Johnston.

The following portion of the report was prepared by Mr. Johnston and contains additional information on a number of points, but it is believed that the two reports are in no way in conflict and therefore have been combined and signed by the members of this committee.

## CONCLUSIONS AND RECOMMENDATIONS

(Report prepared by W. W. Johnston)

The investigation reported herein has led to the following conclusions:

That the Gem irrigation district includes approximately 19,000 acres of irrigable land, of which some 13,000 are now being irrigated. Expansion to the maximum acreage will require the completion of the drainage system and the enlargement of the distribution to serve the additional area.

That the social benefits and wealth created have justified the construction of this district, but that it will be impossible for the district to pay all its creditors in full.

That the district has obtained title to practically all of the unsettled land and has sold all of it, except portions which require further drainage or lateral construction, on long-time terms at appraised prices running from \$2 to \$50 per acre. Construction is being extended to make possible the settlement of the remaining unfarmed area.

Money secured from land sales has been used for drainage construction. The drainage program is from one-half to two-thirds completed, and additional payments from this source, supplemented with small amounts from operation and maintenance collections, will be sufficient to complete the drainage program without incurring further debt.

The present yearly water charge of \$7.50 per acre is the maximum that the lands of this district will stand. This should be reduced to \$6.50 within a few years if the district is to prosper.

The limiting factor in the financial solvency of the district is in the accumulated warrant, bond, and interest indebtedness. This indebtedness must be liquidated if the district is to be in shape to meet its future obligations to the United States under the Owyhee contract. The district holds an option to settle its accumulated debt of \$1,600,000 for \$350,000 if paid in cash by September 18, 1929. The district has attempted to raise this by offering its distribution system to the Bureau of Reclamation for this amount, this to be returned with the construction repayment of the Owyhee project. So far this proposition has been refused. The desirability of reconsidering this decision would depend on additional considerations which the district might offer.

The district officials have offered the following, which they consider as additional consideration to justify the payment of this sum:

(1) A flow of 50 second-feet developed in district drains which can be diverted for irrigation.

(2) The use of the district drainage system as outlet for drains to be constructed in new lands lying above it.

(3) Any right the district may have in receipts from the sale of power from the Black Canyon power plant.

(4) An agreement to be secured with the district creditors to turn over to the Government the pumping and electrical equipment of the district.

The value of these considerations is mainly in the possible augmentation of the water supply for the Owyhee project. It is recommended that this matter be referred to the engineering division for an opinion as to the value thereof.

The only method of liquidating this debt, except by sale of the distribution system to the Government, is by settlement with the creditors on a partial-payment basis on long-time terms. After cheaper water is available from the Owyhee project the district could raise not to exceed \$22,000 annually to apply on such indebtedness. This would equal a principal of \$315,000, or \$441,000, depending on whether it were amortized in yearly payments of 7 per cent or 5 per cent. Some such settlement of the accrued debt is essential if the district is to be good security for its share of the construction cost of the Owyhee project.

## HISTORICAL AND DESCRIPTIVE

The Gem irrigation district lies southwest of the Snake River, in Owyhee County, Idaho. Homedale, the headquarters of the district and its main town, is situated some 12 miles west and 3 miles south of Caldwell, to which town the area is tributary. The district includes a gross area of 26,800 acres below existing canals, and some 24,000 acres lying above such canals which will be susceptible of irrigation from canals of the Owyhee project when that project is completed. This report will be confined to the old portion of the district; i. e., the portion lying below existing irrigation canals.



The Gem district was organized in 1909 and the main construction took place in 1913. The irrigation supply is in the Snake River being raised to the irrigable lands by electrically driven pumps with an average lift of 120 feet. Until 1924 power was supplied by the Idaho Power Co. Since that date the main portion has been secured from the Black Canyon plant of the Bureau of Reclamation, shortages being supplied by the Idaho Power Co. The annual power bill under the contract with the power company often ran over \$100,000, and the supply was uncertain. Under the Government contract this cost has been decreased by nearly one-half and, except in times of low water, the supply has been dependable. Amounts paid the United States and the power company during the last three years are listed below.

	Paid the United States	Paid Idaho Power Co.
1926.....	\$42,000.00	\$17,087.00
1927.....	46,529.61	( <sup>1</sup> )
1928.....	46,331.14	13,226.50

<sup>1</sup> Shortage contributed.

The appropriation bill passed by Congress providing for funds necessary for the construction of the Black Canyon power plant stipulated that the creditors of the district subordinate their claims to that of the Government for power. In 1924 such an agreement was secured from creditors representing over 90 per cent of the district's indebtedness. This agreement further stipulated that if settled within five years from the date thereof \$350,000, together with the district's pumping equipment and certain other minor considerations, would be accepted in full payment of the bonded, warrant, and accrued interest debt of the district, amounting to approximately \$1,600,000. It was further agreed that during this 5-year period interest payments would be waived and that in the event this settlement could not be made within the period specified the district would not be held for more than \$1,000,000.

The above agreement was entered into in the belief that the Bureau of Reclamation could be induced to pay the district \$350,000 for its lateral system under an agreement whereby this amount would be returned to the Government with payments to be made for the Owyhee projection construction. On option was given the United States to make this purchase, but it has not been found practicable for the bureau to do so. This option expires with that of the bondholders on September 18, 1929.

#### SETTLEMENT

The high annual irrigation assessments, amounting to \$7.50 per acre during the past five years and \$10 per acre for each of the three preceding years, have had the effect of forcing out settlers who were unfit, and the present residents are generally good farmers. The 1928 census of the district shows a farm population of 704, with 237 families. One hundred and twenty-two farms were operated by owners and 36 by tenants. Of 18 water users who filled in questionnaires, 1 settled on his present holding in 1905, 1 in 1913, 3 in 1914, 1 in 1915, 1 in 1916, 2 in 1917, 2 in 1918, 3 in 1919, 1 in 1920, and 3 in 1927. Most of these settlers lived in the district prior to the dates given, but on other farms than those they now occupy.

#### RECENT SETTLEMENT ACTIVITIES

The Gem district originally included 8,000 acres of State land. Part of this was sold by the State, part was leased, and a portion remained idle. Due to legal limitations, the State lands could not be held for unpaid assessments or water charges. This resulted in considerable loss to the district. By 1927 considerable of the State land had become seeped, and in that year the State legislature appropriated \$50,000 to be turned over to the Gem district to help pay for the improvement of State lands within its boundaries. Following the date of the above appropriation, the district purchased the unsold State lands, amounting to 8,421 acres, at a flat rate of \$10 per acre, using funds secured from the State for this purpose. Title to some 6,587 acres of tax-deed land has

also been secured by the district. Lands thus acquired have been offered for sale at appraised prices ranging from, \$2 to \$50 per acre, and buyers have been secured as fast as drainage and water delivery have been provided. The secretary of the district has provided the following statement of sales since September 1, 1925. These lands are sold clear of back taxes and assessments.

2,233 acres sold, at \$33.79 plus-----	\$74, 795. 00
4,015 acres sold, at \$17.11 plus-----	\$68, 702. 80
1,846 acres sold, at \$5.78 plus-----	\$10, 678. 50
8,094 acres, average \$19.03-----	\$154, 176. 30
Collections on above to July, 1929 (approximate)-----	\$60, 000. 00
Number of contracts-----	168

The district in 1929 has assessed 13,210 acres as irrigable and is supplying water to 600 acres of recently drained and 500 acres of new land free of charge. The district is expected to develop an ultimate irrigable acreage of 19,000 acres. The difference is in land not yet drained and in areas to which the district can not at this time deliver water because of limitations in flumes and other structures. There are, as far as the undersigned were able to find out, no farms in the district which are in shape to raise crops and to which irrigation water can be supplied that are not now occupied and under cultivation. It is expected that the area of idle lands will be gradually decreased as the drainage system is extended and structures are enlarged.

#### CREDIT

Due to the high irrigation costs and the financial status of the Gem district, the Federal land bank has not made loans in that district. With a few possible exceptions the same can be said of private loan institutions. The result is that practically the only mortgage indebtedness of farms in the district is in amounts still due on the purchase price. Old debts of this sort have either been paid up or liquidated by foreclosure. As far as could be learned, present mortgages or contracts to purchase are on fairly long-time terms with reasonable interest rates. With the exception of land purchases as indicated above, the only credit available to landowners in the Gem district is in the form of limited loans on liquid assets for the purpose of harvesting crops and, to a limited extent, for the purchase of livestock and machinery. The prevailing interest rate is 10 per cent.

Cheap credit wisely administered would add much to the prosperity of this district. The most prosperous farmers are those who are feeding their forage and most of their grain to some sort of livestock. Many of those who are selling all the crops raised would keep livestock if they could finance the purchase of foundation herds and equipment and improvement needed to handle livestock profitably. If the finances of the district can be placed on a stable basis, intermediate credit associations could be organized to make available money repayments on long-time terms, but until such a time it is believed inadvisable for efforts to be made to increase the indebtedness of the water users. It would be poor business for both the lender and the borrower. In fact the inability of the water users to get heavily in debt has been an important factor in their ability to meet past high water charges, since they have had very little other fixed expense.

The farmers of this district would be benefited by having proper assistance in working out better methods of farming and marketing. It is not believed, however, that a need for an extensive system of guidance, such as is followed by the sugar-beet companies, for instance, is a limiting factor in the prosperity of this district. This is because the larger part of it has passed the pioneering stage. The farms yet to be developed are near older farms, and the new settlers will have reasonably good opportunity to observe the types of farming and the methods that are the most successful. This statement applies to the old part of the Gem district and does not have reference to any new lands under the Owyhee project.

#### IRRIGABLE LANDS

The lands of the Gem district were classified by W. W. Johnston in the spring of 1927. Since this classification has already been reported, only a summary of areas is included in this report. These data follows:

	Acres
Class 1.....	7,248
Class 2.....	5,764
Class 3.....	3,742
Class 4.....	1,022
Subtotal.....	17,776
Class 5.....	3,042
Class 6.....	7,132

Classes 1 to 4, include agricultural lands graded according to their relative value for irrigation farming. Class 5 includes lands which at the time the classification was made were nonproductive because of seepage and alkali accumulation. Class 6 includes nonirrigable lands. Due to the fact that drainage construction has been started when this classification was made, no lands were placed in Class 5 unless they were nonproductive at that time. Considerable additional land was seriously affected by seepage. The total of classes 1 to 4 is greater than that being irrigated at this time. The difference is mainly in lands for which the district is not yet prepared to deliver water. On the assumption that at least one-half of the Class 5 lands will finally come into production, it is believed safe to count on an ultimate development of the irrigable area to at least 19,000 acres.

#### SOILS

The district includes a body of highly productive soil generally of excellent topography and with large bodies of irrigable land uninterrupted by non-irrigable areas. The texture varies from clay loam to coarse sandy loam. The soil in the higher elevations of the project, particularly in the large area of smooth-lying land west of Marcling is generally a light-colored silt loam which is high in lime. The subsoil varies from gravel to joint clay but in practically all instances has good drainage properties. The coarse sandy loam lands are found near the Snake River and there is a gradual gradation between these two extremes. The sandy soils have a rather high water requirement, but are excellent alfalfa lands. These are less valuable for grain production and do not work into a rotation as well as the heavier lands. Except where accumulated, as the result of seepage, there is practically no indication of harmful quantities of alkali. "Slick spots" and areas with hardpan at shallow depths are practically nonexistent.

#### DRAINAGE

Early reports on the Gem district indicate that some seepage began to develop soon after the irrigation of the Gem district was started. By 1913, the seeped area is reported to have reached a gross area of about 5,000 acres. In 1926 the district purchased a used electric dredge from the Bureau of Reclamation and started drainage construction. Funds for the purchase of this dredge and for the operation of it since that time were secured from the sale of lands, supplemented by small amounts from the operation and maintenance account. According to the district officials, "the actual digging of drainage canals was begun in the fall of 1926, and since that time 24 miles of drainage canals have been constructed. This required excavation of 1,515,128 yards of dirt at a cost to the district of \$70,260.80 or \$0.046 per yard, resulting in the reclamation of 5,100 acres of land at the cost of \$10.50 per acre."

The drainage system is said to be from one-half to two-thirds completed. The remaining construction will include feeding drains as well as main drains and will probably cost more per acre served than the portion already completed. The writers have never seen a seeped area of this extent which has responded so quickly to drainage.

#### DUTY OF WATER

Following is a statement furnished by the water master of the Gem district of the use of water on that district during 1928:

## Water delivery, 1928

	Acre-feet per acre
A canal, 5,163 acres-----	4.40
B canal, 3,710 acres-----	3.72
C canal, 1,889 acres-----	5.95
D canal, 1,453 acres-----	5.95
12,815 acres-----	<sup>1</sup> 4.40

It is not known to what degree of accuracy the water measurements were taken, but it is possible that the above figures include some canal losses in addition to actual farm deliveries. The larger portion of the land under A canal has a high-water holding capacity and would be subject to a fairly high duty. The use indicated above is believed to be excessive and made possible by excess capacity in the A canal pumps and distribution system. B canal has a limited capacity and serves sandler land. It is believed that the use indicated represents a fairly high duty for this land. While C and D canals serve sandy lands with a high irrigation requirement, the use indicated is considered excessive. Based on an ultimate development of 19,000 acres, the following is believed to approximate a water duty at the land which is as high as will be consistent with profitable crop production.

	Acre-feet per acre
6,000 acres, at-----	3.20
8,000 acres, at-----	3.75
5,000 acres, at-----	5.00
Total, 19,000 acres, at-----	<sup>1</sup> 3.90

According to the economic report on the Owyhee project, published in 1925, a water duty of 3.22 of live water at the land was taken for that project, to be increased to about 3.50 by use of recovered water. The Gem district has developed a flow of some 50 second-feet in drains which can be diverted for use on the lower-lying lands. The district officials have expressed the opinion that credit should be given them for this amount of water when calculating the Government construction charge under the Owyhee project. It is our belief that if the district is legally entitled to this water it would be better for them to retain at least the larger part of it to be used to supplement that to be supplied from the Owyhee Reservoir, since the duty as calculated for the Owyhee project is higher than is believed desirable for the Gem district.

## CROP AND LIVESTOCK PRODUCTION

Following is the crop and livestock census report of the Gem Irrigation district for the years 1927 and 1928:

## Gem irrigation district, crop report

	Area in acres			Area in acres	
	Year 1927	Year 1928		Year 1927	Year 1928
Wheat-----	4,918.25	5,612	Cane-----	3.5	-----
Oats-----	264.5	167	Cucumbers-----	7	-----
Barley-----	798	968	Carrots-----	1	-----
Corn-----	774.14	351	Beans-----	-----	10
Alfalfa seed-----	118	-----	Acres reported-----	12,057.42	12,168
Beans-----	11.5	-----	Acres not reported-----	1,783.96	-----
Potatoes-----	207.75	292	Acres cultivated-----	13,841.38	-----
Alfalfa hay-----	3,383.79	3,252	Dairy cattle-----	655	477
Clover hay and seed-----	585	468	Beef cattle-----	64	35
Pasture-----	877	920	Horses-----	679	643
Peas-----	6	-----	Sheep-----	1,680	1,194
Rye-----	17	35	Hogs-----	3,928	3,948
Garden-----	7	-----	-----	700	704
Onions-----	7.5	-----	Census on farms-----	172	-----
Millet-----	17	-----			
Orchard-----	38.5	34			
Wheat hay-----	15	-----			

<sup>1</sup>Average.

\*People.

\*Families.

An estimate of acre yields has not been taken by the district. Following is a statement of the average yields reported by 18 farmers who filled in questionnaires covering their operations for 1928:

Crop	Number reporting	Average		
		Acreage	Yield per acre	Value per acre
Wheat.....	17	55.4	<sup>1</sup> 41	\$40.50
Alfalfa.....	16	36	<sup>2</sup> 4.6	47.00
Barley.....	7	11.3	<sup>1</sup> 54	35.00
Clover seed.....	5	7.6	<sup>1</sup> 43½	57.00
Potatoes.....	3	17	<sup>1</sup> 377	-----
Corn.....	4	10.8	<sup>1</sup> 40	36.00
Pasture.....	9	7.4	-----	32.00
Oats.....	8	3	<sup>1</sup> 75	43.00

<sup>1</sup> Bushels.<sup>2</sup> Tons.

The most significant information from the above tabulations is in the large acreage of wheat and alfalfa, the large number of hogs kept, and in the high yields secured. The trend of the farming practice in the district is toward larger holdings, cheaper production with tractor equipment, including the harvesting of grain with small-sized combines and handling clover seed with tractor, mowers, and bunchers. The most successful farmers feed a large part of their grain to hogs and make full use of alfalfa pasture in raising these animals. This type of farming is best developed on the heavier soils which predominate in the southern part of the district. The sandler areas near the river are better adapted to small-sized holdings with dairying as the basic industry. This is because the latter areas do not produce as high yields of grain and, due to topographic irregularities, are less suited to the use of tractor machinery.

## TYPICAL FARM PROGRAM

In the following tabulation is shown a typical farm set-up for the Gem district. The results shown are better than can be expected by the district as a whole, because of inadequate financing and the limitation in the capacities of part of the water users. On the other hand, the best farmers in the district are doing better. Results as indicated could be expected by an experienced farmer who was properly financed and who had developed his farm up to a fairly good producing state.

*Farm of 80 acres*

Acres	Cropping plan	Acre yield	Livestock
5	Farmstead, etc.....	-----	4 horses, 6 cows (additional young stock on hand, 3 yearlings and 3 calves), 6 sows (60 hogs sold yearly), 100 chickens.
5	Mixed pasture.....	-----	
10	Alfalfa hay.....	<sup>1</sup> 0.5	
20	Clover seed.....	<sup>2</sup> 0.5	
20	Clover hay.....	<sup>1</sup> 1.5	
10	Barley.....	<sup>2</sup> 60	
10	Corn.....	<sup>2</sup> 45	
20	Wheat.....	<sup>1</sup> 40	

<sup>1</sup> Tons.<sup>2</sup> Bushels.

# 224 .ECONOMIC SURVEY OF CERTAIN IRRIGATION PROJECTS

## INVESTMENT

Improved farm <sup>1</sup> -----	\$8,000
Implements-----	1,600
Automobile-----	750
4 horses-----	300
6 cows-----	600
6 sows-----	180
100 chickens-----	100
Total-----	11,530

## YEARLY RETURNS

Alfalfa, 10 tons, at \$7.50-----	\$75
Clover hay, 30 tons, at \$7.50-----	225
Clover seed, 100 bushels, at \$12-----	1,200
Wheat, 600 bushels, at \$0.90-----	540
Barley, 320 bushels, at \$0.60-----	192
Subtotal crop sales-----	2,232
60 (200-pound) hogs, at 9 cents per pound-----	1,080
1,320 pounds butter fat, at 43 cents-----	570
100 chickens (eggs and poultry)-----	200
Subtotal livestock sales-----	1,850
Total yearly sales-----	4,082

## YEARLY EXPENSE

Labor (hired)-----	\$590
Seed-----	166
Repairs and upkeep on equipment and buildings-----	350
Insurance-----	26
Harvesting (cut by hired combine)-----	150
Board for harvest crew-----	8
Taxes-----	160
Irrigation-water assessments-----	600
Family living, doctor, recreation, etc-----	1,000
Threshing clover seed-----	150
Automobile operation-----	150
Automobile depreciation-----	100
Total yearly expense-----	3,450
Balance for interest and profit-----	632
Interest on investment (per cent)-----	5.5

## PERMISSIBLE ASSESSMENTS FOR IRRIGATION WATER

In the above calculations, annual assessments for irrigation water have been taken at the present rate of \$7.50 per acre. An analysis of the figures given will show that this is about the maximum that the farmer could afford to pay. In fact if he were paying interest on a considerable part of his investment it would be difficult for him to raise this amount. As has been indicated, one reason why these high assessments have been collectible is that the land owners have been unable to secure loans and are therefore not paying out large amounts in interest. Another reason is the high productivity of the region and it is pointed out by the district officials that many are making sacrifices to keep up these payments in the hope that these may be materially decreased when gravity water from the Owyhee project is available. The last statement is supported by information secured in the field. It is believed that the present assessment is the maximum that can be collected, and if the district is to be considered good security for its portion of the construction cost of the Owyhee project the water users should be able to look forward to a reduction to \$6.50 per acre within the next few years.

<sup>1</sup> Land can be purchased in the Gem district for much lower prices, but the cost of good land plus improving to a point that it will produce the returns shown below will total at least this much.

## IRRIGATION DISTRICT FINANCES

The Gem district has been handling its affairs on practically a cash basis for the past 5 to 10 years. It is gradually improving its irrigation system and is constructing its drainage system. These improvements are being made without incurring further debt. The fact that the district has secured title to practically all of its unsettled land and is selling it on reasonable terms, as fast as it can be drained and supplied with irrigation water, has largely solved the speculation problem and, to a considerable extent, the settlement problem, as far as the old district is concerned. The contract with the United States for gravity water under the Owyhee project will insure a future water supply at more favorable terms than they are now paying. These conditions are reassuring. The controlling factor in the financial solvency of the district and in its ability to meet future debts due the United States is in its accumulated indebtedness.

As was indicated in an introductory paragraph the district holds an option to settle its accumulated debt of \$1,600,000 for a cash payment of \$350,000 plus certain other minor considerations, if paid by September 18, 1929. The creditors have agreed that in the event this option is not taken up by the date specified, the debt will in no case exceed \$1,000,000. It seems certain that none of this debt can be paid while the district is operating under its present system. The assessment of \$7.50 per acre represents the maximum that the land will stand for irrigation charges. And this amount is required for operation and maintenance, payment of the power bill, and the completion of the drainage system. After gravity water becomes available and the drainage system is completed it will be possible to raise a limited amount each year to apply on this indebtedness.

If the present option is not taken up and settlement on the basis of \$1,000,000 is attempted after the drainage system is completed and gravity water is available, approximate assessments would need to be made as follows:

Payment of \$1,000,000 in yearly payments to amortize at 7 per cent.	
Basis of ultimate irrigable area of 19,000 acres.	
Operation and maintenance, at \$1.75 per acre	\$33,250.00
Government construction, \$145 per acre, payable in 40 equal yearly payments	68,875.00
\$1,000,000 at 7 per cent.	70,000.00
Total yearly assessment	172,125.00
Water charge per acre	9.05

The above plan would obviously be unworkable for as has been pointed out the land will not stand such high water charges.

If, has been urged by the district, the Government would execute its option and purchase the distribution for \$350,000, this amount to be returned as supplemental construction in 20 years, the following plan could be followed:

Operation and maintenance, at \$1.75 per acre	\$33,250.00
Government construction	68,875.00
Supplemental construction	17,500.00

Total year assessment	119,625.00
Water charge per acre	6.30

The only other workable plan would appear to be for the district to secure an agreement with the bondholders which would provide for annual charges for water not to exceed \$6.50 per acre. On the basis of 19,000 acres, this would allow the following settlement:

Operation and maintenance, at \$1.75 per acre	\$33,250.00
Government construction	68,875.00
Left for debt repayment	21,375.00

Total	123,500.00
Water charge per acre	6.50

Principal represented in above debt repayment if calculated on amortization basis, principal and interest to be retired by total payment of 7 per cent per year (approximately)

300,000.00
------------

Figured on basis of 5 per cent amortization

420,000.00
------------



It is believed that no funds can be collected by the district for debt repayment until cheaper water is available from the Owyhee project, and that after that date approximately \$21,000 represents all that they will be able to raise one year with the other. It may appear that since the district is at present assessing \$7.50 per acre per year that a larger sum could be raised, but the collection of this amount with a \$6.50 assessment is based on a full district development of 19,000 acres. Complete settlement of the district can not be expected at the outset, and, in the meanwhile, the acre assessment will need to be greater. If the operation and maintenance and Government construction charges were to remain at the same rate per acre, as assumed above, the present 13,000 acres being assessed, would have to meet a per-acre charge of \$7 in order to raise this amount. The operation and maintenance would undoubtedly be higher for the smaller acreage, and it would therefore be expected that assessments would approach \$7.50 per year for several years after such collections were started.

#### PURCHASE OF THE GEM DISTRICT DISTRIBUTION SYSTEM BY THE UNITED STATES

At the time of starting this economic study the investigators were supplied with a written statement setting forth the desires of the district in connection with its relation with the Bureau of Reclamation, together with information supporting the feasibility of their requests. The main points in this statement may be summarized as follows:

1. That before September 18, 1929, the United States purchase the distribution system, in accordance with its option, for the sum of \$350,000; this sum to be used by the district to settle with creditors who are owed some \$1,600,000 but have agreed to settle for the former amount.

2. That the district be credited with the full amount charged contractor at the Owyhee Dam for power from the Black Canyon plant, the justification for such request being that the Gem district is now paying maintenance, depreciation, and interest on the entire cost of that plant, and that the use by the contractor has necessitated the purchase of power from the Idaho Power Co. to replace a part of all of this amount at a high figure.

3. That the district be given credit for 50 second-feet of water developed from drains which can be used for irrigation. On the basis for construction estimates for the Owyhee project this is claimed to be worth \$480,000.

4. That the drainage system now constructed or in process of construction will provide outlets for any drainage that may be required on the adjoining higher lands of the Owyhee project, a condition which is considered to be of value to that project.

5. That the district is willing to accept \$350,000 for all of the above, i. e., (a) the Gem district distribution system; (b) money from sale of power to Owyhee contractor; (c) irrigation water developed in drainage system; (d) use of drains as outlet for higher lands.

6. In addition, the district officials have expressed the opinion that the creditors of the district will be willing to turn over to the United States the pumping plants and transmission lines of the district.

As has been indicated, it is believed that it would be to the best interests of the Gem district to retain control of at least the largest part of the irrigation water that is being developed from its drainage system. If, however, it is their desire that this be turned over to the Bureau of Reclamation, it would appear to have some value. The value of this irrigation supply to the Owyhee project, and also the value of the pumping system and of the use of drains as outlets for the new lands of the Owyhee project are engineering matters with which this report does not deal. It is believed, however, that these are of enough importance to warrant consideration by the engineering division.

The 3-party contract between the Gem irrigation district, the Idaho Power Co., and the United States provides that the Gem district shall be credited for the power reserved to the Government from the Black Canyon plant and now being used at Owyhee Dam, at the same rate per kilowatt-hour that is being paid by the district to the Government. These credits are being given for power which is used by the contractor at the Owyhee Dam. The increased credit requested by the district on this account would be in conflict with the terms of the contract and it is believed would also be in conflict with the law recently enacted by Congress which requires that net revenues from this source be applied, first, to pay the cost of the Deedwood Reservoir; second, the Black Canyon power plant; and third, one-half the cost of the Black Canyon Dam,

until the United States shall have been reimbursed for all expenditures incident thereto.

The Deedwood Reservoir, which is expected to be completed in the spring of 1931, will relieve the district from any further payments to the Idaho Power Co., and is also largely beneficial to the district in assuring an abundant power supply and some credits from sale of surplus power. This reservoir must be paid for from some source and it appears to us that it would be equitable to apply the net power receipts to this purpose, even if this disposition of the power profits had not been required by Congress. The important benefits mentioned above are secured by the Gem district without any increase in payment.

The district has maintained its pumping plants in good condition, and, if it should be found advisable to increase the water supply of the Owyhee project as a whole by furnishing cheap power and continuing pumping for the two lower lifts of the Gem districts, these pumping plants which the district is willing to convey as an additional consideration for the proposed cash settlement would be valuable.

#### JOINT CONCLUSION—APPLICABLE TO BOTH PARTS OF REPORT

Some method of liquidating the bonded and warrant indebtedness upon a basis which will bring the total payment requirements within the limits of the ability to pay is necessary to the success of the project.

This object might be accomplished either by the plan outlined on pages 23, 24, and 25 of this report (if acceptable to the bondholders and other creditors of the district), or by the plan urged by the district on pages 49 and 50 (if acceptable to the department).

### BITTER ROOT IRRIGATION DISTRICT, MONTANA

(By George O. Sanford, Superintendent Sun River Project, Montana)

#### INTRODUCTION

The Bitter Root project was investigated by George O. Sanford, superintendent of the Sun River project, June 20 to 28. It is a private project and has been operated since 1910. The farms are well developed and a good system of diversified farming is followed. There are very few of the difficulties connected with this project that are found on some of the Federal reclamation projects. The problem here is to find ways and means for financing an extensive program of betterments on the main canal. If this can be done there is no reason to believe the project will not be a success.

#### LOCATION AND CLIMATIC CONDITIONS

The Bitter Root Irrigation project is located in Ravalli County in the south-westerly portion of Montana, west of the Continental Divide and comprises an area of nearly 20,000 acres of bench land on the east side of Bitter Root River. The average elevation of the project is 3,600 feet above sea level. The climate is generally milder than most portions of Montana and it is the principal section in the State where apples and cherries are grown successfully on a commercial basis. The average rainfall is between 11 and 12 inches, about half of which falls during the growing season.

#### SOILS

The soils of the project are, for the most part, sandy and silt loams, which in places contain considerable gravel. In all portions of the project there is ample evidence of good soil fertility. Soil surveys have been made by the State Agricultural College and the results of their work are shown on the soil-survey map included in the appendix of this report.

#### WATER SUPPLY

The principal water supply comes from Rock Creek, one of the west side tributaries of the Bitter Root River. In addition to this a considerable quantity of water is diverted into the main canal from several of the east side creeks. Como Lake reservoir, with a capacity of 34,000 acre-feet, has been

built on Rock Creek. The dam is a substantial earthen embankment with a maximum height of 65 feet above the creek bed, 2,700 feet long, with controlling works consisting of a 74-inch wood stave pipe incased in concrete with a gate tower at the inlet end of the pipe. The water supply of the project has been carefully analyzed by Mr. A. J. Wiley, consulting engineer, in his report of August 30, 1923. He reaches the conclusion that there might have been some shortage of water in 1911, 1915, and 1919, but that this apparent shortage does not require additional storage but can be provided for by reducing seepage losses in the main canal, and recovery of waste and seepage water which can be applied to beneficial use. It is my opinion that a further saving can be made in case of any possible shortage by requiring a more economical use of water. Mr. C. B. Heidle, former State engineer of Montana, has passed upon the project water supply and pronounced it adequate. The average duty for the past seven years is 5.3 acre-feet per acre, but in 1928, with an irrigated area of 14,851 acres, the duty was 4.35 acre-feet.

#### TRANSPORTATION AND INDUSTRIAL DEVELOPMENT

A branch of the Northern Pacific furnishes adequate transportation facilities, connecting with the main line at Missoula. There are several creameries, cheese factories, and canneries. A cooperative shipping association handles most of the apples. A sugar factory was recently constructed at Missoula, all of which shows that the farmers have an outlet for all of the important products of the farm.

#### DESCRIPTION OF CANAL SYSTEM

The main canal has a length of 72.16 miles and originally consisted of the following types of construction:

- 59.48 miles of earthen canal.
- 1.78 miles of steel pipe.
- 0.96 miles of wood stave pipe.
- 9.94 miles of wood flume.

The system was built by the Ravalli Water Co. in 1910, and while there is no information as to what the original cost might have been it is believed that it must have cost close to \$2,000,000. The principal weakness in the system was the large number of wooden flumes. Some of these became unsafe after 13 years of operation, and at the reorganization of the project, in 1923-24 funds were provided for replacing about one-half of the old flumes. In most cases earthen embankments were substituted which are giving satisfactory service. Within the next 10 years it will be necessary to replace the remaining 38 flumes at an estimated cost of \$254,144. The lateral system was well constructed and gives satisfactory service. Owing to the character of the soil it is possible to maintain high velocities in the laterals, which has resulted in a very material saving in the cost of construction as well as maintenance. When one views the main canal on the Bitter Root project for the first time he is apt to question the feasibility of maintaining a canal along some of the steep hillsides, but upon an examination of the material, which is principally disintegrated granite, it can be seen that the canal is well constructed and can be safely operated with relatively small seepage losses.

#### DRAINAGE

The Bitter Root irrigation district has been fortunate in not having to construct subsurface drains. In no place was any seepage evident and only in the case of one landowner was mention made of subirrigation, which affected a small tract of land where an exceptionally good garden is grown each year. It is safe to assume that as seepage has not developed there is not much likelihood of it showing up at this late date.

#### HISTORY OF EARLY DEVELOPMENT

Evidently the early promoters of the project expected to make a fortune in selling lands to investors who were led to believe that by buying orchard tracts at a cost running up to \$500 per acre, it would be possible to make a comfortable living by working six months in the year and spending a vacation during the other half. How much money was invested in the project and lost by innocent purchasers is impossible to say. At one time over 12,000 acres had been planted to orchards and all but 2,571 acres have been cut

down and planted to crops better suited to this project. It required considerable time and money to demonstrate that many of the varieties of apples grown in the Yakima country could not be grown on a commercial scale in the Bitter Root Valley. At the present time orchard owners are concentrating on the Makintosh red apple, which is marketed almost entirely in New York.

In December, 1920, the Bitter Root Irrigation district was organized under the laws of the State of Montana. The Ravalli Water Co., realizing that it was impossible for them to continue operations, made a deal with the Irrigation district, whereby the canal system was sold for \$75,000. In 1923, a \$600,000 bond issue was sold and the money used to make payment for the canal system and take care of the replacement of about one-half of the old wooden flumes, the construction program being completed during 1923-24 under plans and specifications outlined by Mr. A. J. Wiley, consulting hydraulic engineer, Boise, Idaho. The bond issue was floated by the Ralph Schneeloch Co. and Freeman, Smith & Camp Co., of Portland, Oreg.

#### REPORTS BY MONTANA STATE COLLEGE

The Bitter Root Valley, which is one of the best farming districts of the State, has been thoroughly investigated by agricultural engineers and economists from Montana State College and a very complete report has been prepared by Mr. Sherman E. Johnson, of the Department of Agricultural Economics. At the present writing this report is being printed and should be available for consideration of the central board who will meet in Denver early in August. The report of Professor Johnson covers the entire Bitter Root Valley and it is generally estimated that the Bitter Root project comprises about one-fifth of the producing area of the valley.

#### AGRICULTURAL DEVELOPMENT

When the project was started it was expected that it would be a second Garden of Eden, but here again it happened that the apple was the cause of Adam's downfall. It was found that while the apple under favorable conditions was very profitable, there were so many uncertainties connected with its production and marketing that it was not wise to carry all the eggs in one basket. At the present time 17 per cent of the producing area is an orchard. There is now a well-balanced program on practically all of the farms and all forage and grain crops are fed to livestock. Peas, sugar beets, and head lettuce form the important cash crops after apples. In driving around the project one is impressed by the quality of dairy cows on the farms and the Bitter Root Valley shipped several carloads of producing cows to California in 1928.

No crop census is taken on the project other than to determine each spring how much area each landowner has in different crops and the area so reported covers the entire irrigable area of the farm; that is, no deduction is made for roads, canal right of ways, or the farmstead. With the areas of the several crops being grown in 1929, an estimated crop yield has been prepared, based upon data compiled by Professor Johnson in his report on the Bitter Root Valley and reviewed by the Irrigation manager, Mr. G. J. Hagens. The estimated returns are shown in the following table:

Crop	Acres	Yield per acre	Total yield	Unit price	Total	Per acre
Alfalfa	4,998	2.5 tons	12,495	\$9.00	\$11,245.50	\$22.50
Apples	2,571	125 boxes	321,375	1.25	401,718.75	156.25
Barley	739	30 bushels		.75	16,627.50	22.50
Beans	16	20 bushels	320	2.50	800.00	50.00
Beets	474	11 tons	5,214	7.00	36,498.00	77.00
Corn	28½	30 bushels	795	1.25	993.75	37.50
Garden	78				15,600.00	200.00
Lettuce	16½	200 crates	3,300	2.00	6,600.00	400.00
Oats	900	60 bushels	54,000	.50	27,000.00	30.00
Pasture	2,558				25,580.00	10.00
Peas	672	40 bushels	26,880	2.00	53,760.00	80.00
Potatoes	45	200 bushels	90,000	.60	5,400.00	120.00
Wheat	1,600	30 bushels	48,000	.90	43,200.00	27.00
Orchard pasture	2,000				15,000.00	7.50
	16,694					
Less duplicated area	2,000					
Total	14,694				660,023.50	44.92

In checking over this tabulation with records compiled by the chamber of commerce at Hamilton, it was the feeling of the secretary that the returns from apple orchards were about 50 per cent too low, but it was thought better to hold to the figures given, which are average figures compiled by the State college rather than to assume larger yields which would cover conditions under better than average practice. In addition to the estimated crop value there is also the revenue received from the sale of livestock. The secretary of the chamber of commerce has a very complete record of all carload shipments out of the valley. Taking his figures and placing conservative values on the several classes of livestock it was found that the total amounted to \$1,282,000, and if one-fifth of this is credited to the Bitter Root project it means an additional income of \$256,400.

Based upon my inspection of the project and interviews with landowners and business men I can say that the Bitter Root project has reached a very high state of agricultural development which can be relied upon to bring in an increasing revenue when agricultural products are placed upon a more equitable basis.

#### STATUS OF LAND OWNERSHIP

In the early development of the project a large percentage of the land was sold in 10-acre tracts and in many cases such ownership still continues. In nearly all cases the resident owner is farming several tracts owned by non-residents. There are 418 landowners in the district of which 207 are resident owners. There are 218 farms improved with buildugs. The size of farms are grouped as follows:

20 acres or less.....	283
20 to 80 acres.....	115
Over 80 acres.....	20
	<hr/>
	418

The average irrigable area of all farms is 46 acres. The census taken in the spring of 1929 showed 1,000 persons living on the farms.

#### VACANT LANDS AND SETTLEMENT PROBLEMS

The records of the project show that at one time all land was held in private ownership. The problem that now confronts the irrigation district board is to secure purchasers for lands that have been acquired by the district because of nonpayment of taxes and at the present time they have 4,509 acres of land for sale at \$20 per acre, one-fifth down, balance in four annual installments, with interest at 6 per cent. A good many sales of such lands have been made in recent years and if assurance can be given that the main canal will be put in safe operating condition no trouble will be experienced in securing purchasers for all of this land. It is self-evident that under present conditions most any man would hesitate to invest all of his capital in an irrigated farm where there is uncertainty each year in receiving water when needed for the irrigation of crops. In a well-developed community like the Bitter Root Valley the raising generation would more than take care of all land that might be offered for sale under the conditions herein described. From this it can be seen that the irrigation district is not confronted with any serious settlement problem.

#### INSECT PESTS

The Bitter Root Valley has received a good deal of free advertising because of the spotted fever tick. There are infected ticks in certain locations on the west side of the river. These locations are prominently marked and the State laboratory at Hamilton has developed a serum so that persons going into the infested districts can be inoculated. The land in the irrigation district is on the east side of the river where no infected ticks have been found.

#### FINANCIAL STATUS, ASSESSMENTS, PAYMENTS, AND DELINQUENCIES

The irrigation district, which was created in 1920, began to function the following year and levied an assessment of \$2.50 per acre. In 1923-24 an issue of 6 per cent bonds amounting to \$600,000 was sold, which bonds are to

be repaid in 30 annual installments beginning 1927, the annual installment of interest and principle being approximately \$47,000. During the first four years interest only was paid. In addition to this payment it costs an average of \$22,500 to operate the project, making a total of nearly \$70,000. While the annual assessment has been increased to \$5 per acre beginning with 1927, the district has been unable to collect sufficient money to take care of the bonded indebtedness, operate the project, and make the necessary renewals. In 1928, when the second \$5 assessment was levied, the total gross income dropped \$7,800 below the gross income of 1927 and the paying acreage fell to 9,644 acres, which seems to indicate that an annual assessment of \$5 per acre is more than the water user can stand and have sufficient left to cover living and operating expenses. Delinquent taxes have been reduced during recent years but still amount to a little over \$66,000 and the area of district land for sale has increased from 2,404 acres in 1925 to 4,509 in 1928. It was found in some cases that men financially able to meet the payment of irrigation district taxes had not done so because of the critical condition of the main canal. If this uncertainty could be removed it would result in a marked improvement in the financial status of the district. Not only would it restore confidence among the landowners but it would stimulate a demand for lands under the project and without doubt it would very soon be possible to dispose of district lands at prices in excess of \$20 per acre. Renters who are now farming land owned by nonresidents would purchase such lands and there are many landowners who would erect additional improvements. The investigation of the project by the Bureau of Reclamation has already had a wholesome influence which has resulted in several men calling on the irrigation manager to inquire about lands that can be purchased.

#### REGISTERED WARRANTS

The district has registered warrants outstanding in the amount of \$82,031 which resulted principally in replacing in 1927 over a mile of wooden flume with an earthen embankment and the expenditure of about \$10,000 in 1928 in repairing a slide in one of the new embankments, the total cost of the two jobs being about \$40,000. The work had to be done in the shortest possible time, which caused extra expense, and there was also an increased cost because of the necessity of reorganizing the construction crew when work had to be suspended several times because of shortage of funds.

#### MORTGAGES

The records of the county clerk and recorder of Ravalli County show the following mortgages on lands in the Bitter Root Irrigation district:

Number of farms mortgaged.....	42
Number of acres.....	1,432
Total amount of mortgages.....	\$101,543.37
Average per acre.....	\$70.90

On some tracts there is more than one mortgage of record which brings the total number of mortgages to 54 with interest rates as follows:

- 14 mortgages at 6 per cent.
- 11 mortgages at 7 per cent.
- 16 mortgages at 8 per cent.
- 9 mortgages at 10 per cent.
- 4 mortgages (interest not given).

The 10 per cent mortgages are all held by local banks but they total only \$3,842. The First National Bank of Missoula has a \$4,500 loan at 10 per cent on 50 acres in the Bitter Root project and lands owned in Lake and Park Counties.

The holders of these mortgages are classified as follows:

Local individuals.....	24
Nonresident individuals.....	18
Local banks.....	11
Outside banks.....	1

## FUTURE PAYMENTS AND RECEIPTS FROM SALE OF LANDS

One of the important matters that was given careful consideration in the investigation was the annual charge that the landowner could pay and still have sufficient funds left to take care of himself and family. The answers received ranged from \$3 to \$5 per acre and was the opinion of several farmers that with a well-developed farm, having about 10 acres of orchard, the \$5 charge is not too great a burden to carry, but after securing many individual opinions and giving careful consideration to payments made during recent years it is my conclusion that under present conditions the maximum assessment should not exceed \$4 per acre, and this conclusion is borne out by the fact then when the levy was increased to \$5 there was a dropping off in the area of land that made payments and very little increase in the total amount paid. The tabulation covering the financial status of the project from 1921 to 1928, which is attached to this report, shows the gross income received from the annual assessments, delinquent payments, and sales of land and water which reached a maximum of \$75,862 in 1927, but which dropped to \$68,002 in 1928 and will probably show a still further reduction in 1929.

## CONDITION OF THE MAIN CANAL

The main canal, 72 miles in length, originally had nearly 10 miles of wooden flumes. Half of these were replaced in 1923-24 principally by earthen embankments. There now remain 38 flumes, all of which will have to be replaced within the next 10 years and in nearly all cases earthen embankments can be constructed which will put the canal in safe operating condition. There will be other maintenance work to be done each year but the smaller jobs can be taken care of in the regular operation and maintenance account. The problem that confronts the district at this time is to find sufficient funds to replace the old wooden flumes, the estimated cost being \$254,144.

This cost is based upon detailed computations made by the irrigation manager, Mr. G. J. Hagens, in conjunction with the State engineer, Mr. J. S. James. Some time was spent in reviewing the unit prices used in arriving at the estimated cost of replacements, and I feel that the figures are well on the safe side and that it will be possible to do the work at less than the estimated cost. In 1923 Mr. Wiley made a very rough estimate of the cost of completing the construction program. A comparison of the Wiley and Hagens estimates shows that the latter is the larger by about 10 per cent. Furthermore, the estimated cost per linear foot is more than the cost of replacing flume No. 1, which was the most expensive job in the whole replacement program. Another factor that should be considered in connection with the estimated cost is the necessity of purchasing a suitable machine to handle the excavation. Mr. Hagens is very anxious to buy a convertible steam shovel and dragline at a cost of \$6,000, which will result in a big saving in handling the rock and earth excavation.

An examination of the work thus far completed in replacing old wooden flumes with earthen embankments shows that the irrigation manager has done an exceptionally satisfactory job. In many cases he has been handicapped by a division of opinion among the water users as to the best plan to follow and what is more serious by lack of funds, and yet he has gone ahead with the work in a courageous and efficient manner, and the seepage losses in the embankments thus far constructed are so remarkably small that he is deserving of praise and commendation for the results thus far accomplished, and in my opinion the future replacements can be accomplished in an equally satisfactory manner.

## MENTAL ATTITUDE OF LANDOWNERS

The interviews with the landowners, bankers, and business men of the project showed clearly that they were all in a very discouraged frame of mind, owing to the poor condition of the main canal. Progress has practically stopped. The pea companies are reluctant to increase the acreage of this crop. The sugar company at Missoula is doubtful as to going ahead with the sugar-beet development. The Federal land bank of Spokane will not make loans. There



are a number of water users financially able to pay the annual assessments but who are holding back because of uncertainties of the future as there seems to be a feeling that if they do pay the district charges it will be paying for something that will bring no return. The problem on the Bitter Root project simmers down to the rehabilitation of the main canal. If this can be done, it will restore confidence in the entire community; new settlers will come in; renters will purchase farms they are now operating, and landowners will be ready to increase their investment by constructing additional improvements, planting new orchards, and acquiring additional livestock. On the other hand, if ways and means can not be provided for carrying on the necessary replacement work, it is self-evident that the project is doomed to failure and that the present landowners will suffer a heavy loss as well as the parties who own the irrigation-district bonds. Based upon the examination I have reached the conclusion that the project is sound from an agricultural and economic viewpoint. Certainly no project in Montana shows a higher state of development and diversification, and there is no reason to believe that it can not be brought to a higher state of prosperity if a solution can be found for the present difficulty that the district is facing.

#### SUGGESTED SOLUTIONS

The main question to be answered is where to secure \$250,000 to make necessary improvements on the main canal. A Federal loan of \$700,000 has been hoped for by the irrigation district officials, and while it is my opinion that such a loan can be considered safe there are several reasons why some other solution should be sought. One very important thing is that prompt action must be taken. There would probably be a considerable delay before negotiations could be concluded for a Federal loan. It is assumed that if such loan could be arranged the money would come from the reclamation fund which has already been reduced to such an extent as to seriously interfere with the 10 year program approved by the Secretary of the Interior in 1926. If the precedent were established of the Federal Government coming to the aid of one sick private irrigation project it would result in such a demand for assistance from other private projects as to call for the loan of Federal funds running into many millions of dollars, all of which is so impossible as to cause the Federal loan to be definitely abandoned.

A refunding bond issue has been suggested but when it is realized that such an issue must be of sufficient size to take up the first issue now amounting to \$577,000; clean up outstanding registered which amount to \$82,000; provide funds for necessary replacements, and then be sold at a discount, it is self-evident that there is not sufficient revenue in sight to pay interest and principal on the bonds and operate the canal system. There seems to be but one solution left and that is for the bondholders to come to the assistance of the landholders. Viewed from certain angles this may not be a very popular suggestion but here is the situation—unless some means is provided for the replacement there is certain to be a big loss both for the landowners and the bondholders.

The bonding company has been very helpful in the past when a pinch came. They may be able to do something now, but there's no use trying any halfway measures. The main canal has got to be fixed. The policy governing expenditures for the next few years should be: First, operate the canal system, which will cost about \$22,700; second, do such replacement work as is necessary; third, take up all outstanding registered warrants; and fourth, apply any balance as interest payments on the bonds. Such a program means that the bondholders must accept some loss, but this seems to be a better proposition than wiping out both interest and principal. With confidence restored it may possibly be that the total receipts from the district will be more than \$70,000 per year, and if such is the case, then the payment of principal and interest can be resumed somewhat earlier than can now be anticipated. In any event the district must use every possible means to get out of the hole as soon as possible, and the bonding company and bondholders must realize that they have got to do their share—something is going to happen, and the wise thing to do is to adopt such a program as will do the least possible damage to all concerned.

A tentative financial program for the next four years might be worked out as follows:

**Income:**

District taxes for 4 years at \$70,000.....	\$280,000
One-half of present delinquent taxes.....	33,000
Interest and penalties.....	11,000
Payments on land contracts.....	24,000
Interest.....	2,880
One-half of value of unsold lands.....	45,000
Interest on deferred payments.....	4,400
	<u>400,280</u>

**Expenditures:**

Operation and maintenance for 4 years.....	93,800
Outstanding registered warrants.....	83,300
Interest on registered warrants.....	10,000
	<u>184,100</u>
Balance for replacements.....	216,180

While this does not equal the estimated cost of replacements it is reasonable to assume that the receipts will be in excess of the amount shown above and that the actual cost of replacements will be less than the amount estimated.

*Bitter Root irrigation district—Montana*

FINANCIAL STATUS

	1921	1922	1923	1924	1925	1926	1927	1928	1929
Acres-water charge.....	\$2.50	\$3.00	\$4.00	\$3.74	\$3.74	\$4.00	\$5.00	\$5.00	-----
Acres charged.....	19,893	19,084	19,084	19,084	19,084	19,225	19,374	19,358	-----
Acres paid.....	10,249	8,282	8,775	8,427	10,862	12,419	11,461	9,644	-----
Amount paid.....	\$25,679	\$24,846	\$18,504	\$32,812	\$43,838	\$41,363	\$46,586	\$40,115	-----
Amount delinquent pay- ments.....		5,884	9,276	20,162	19,701	9,217	16,740	12,389	-----
Payments on land sales.....						9,396	7,002	3,790	-----
Water sales.....	26	430		402	3,076	4,820	3,805	2,433	-----
Miscellaneous.....	2	182		411	762	349	1,729	279	-----
Gross income.....	25,707	31,342	27,780	51,787	67,377	65,145	76,862	68,002	-----
Outstanding bonds.....			550,000	600,000	600,000	600,000	600,000	589,000	\$577,000
Registered warrants.....	11,198	49,886	71,041	15,929	10,286	15,538	46,903	82,031	-----
Expenditures:									
Operation and maine- nance.....	25,555	30,077	35,608	29,588	26,381	27,892	29,264	42,742	-----
Reconstruction.....	10,730	35,529	111,706	341,680	3,736	4,559	30,782	14,204	-----
B. and payments.....			9,933	29,529	36,000	36,000	47,000	47,340	46,620
Land purchase overhead.....						2,532	2,237	877	-----
Total.....	36,315	65,606	157,247	461,788	66,117	70,983	109,283	105,163	-----
Receivable:									
Delinquent taxes.....	24,159	53,018	101,994	125,743	90,586	68,749	62,906	166,110	-----
Land contracts.....						21,212	28,085	24,148	-----
Acres: District county land for sale.....					2,404	3,432	3,868	4,509	-----
In crop..... acres.....		11,866		11,783	12,741	12,877	14,901	14,851	14,694

<sup>1</sup> These figures do not include interest at 6 per cent.

PALO VERDE IRRIGATION DISTRICT, CALIFORNIA

(By Ed. F. Williams, George W. Scott, and L. A. Hauser)

ISTORY

1. The Palo Verde Valley, comprising some 90,000 acres, all of which can be irrigated by gravity flow from the Colorado River, lies about 240 miles east of Los Angeles and 70 miles northeast of Imperial Valley.

Some 50,000 acres of this valley were acquired by homestead and desert entry. The first settlers came to the valley in the eighties. Not till after 1900 did

settlers come in considerable numbers, and not till after 1912 was all the Government land of the valley filed upon by settlers.

Some 42,000 acres of the valley were acquired by one Thomas Blythe in the seventies. This land was acquired through the swamp and overflow act.

Irrigation began in the seventies, but not till after 1907 did the general development of the valley begin. In 1906 all the Blythe estate was purchased by the Palo Verde Land & Water Co. This company in 1908 formed the Palo Verde Mutual Water Co. The purpose of this company was to construct an irrigation system and a levee system for the benefit of the entire valley.

During the first few years following 1908 the Mutual Water Co.'s charges for operation and maintenance were but from \$2 to \$4 per acre.

The Palo Verde Land & Water Co. sold their raw lands at \$20 to \$45 an acre. Thomas Blythe constructed about 20 miles of levee. These levees varied in height from 6 inches to 2 feet.

The Palo Verde Mutual Water Co. repaired the Blythe levees from the intake to a point east of the town of Blythe, and in 1909, with these levee tops well above the crest of the flood, safely withstood the most gigantic flood that has ever been recorded by compilers of Colorado River discharges.

After passing safely through the great flood of 1909 the water users of the Palo Verde Valley felt safe against the possibility of the Colorado River ever overtopping their levees. The exceptionally low river of 1910, however, rose so high on the levees that during 1910 and 1911 the levees were raised and strengthened from the intake to a point due east of Blythe.

In 1912 the flood waters topped the levees at a point 3 miles below the intake and a stream of water some 3 miles wide swept down through the heart of the finest land of the valley. During the years that followed the levees were raised from time to time, but the water users suffered from a repetition of disastrous levee breaks.

In 1916 J. C. Allison, who had had much engineering experience in Imperial Valley, was made chief engineer of the Palo Verde joint levee district—a district that had been formed that bonds might be sold to complete our levee system.

Mr. Allison made a careful study of our river conditions, compared the Yuma records of river gauges and discharges from 1909 to 1917 with corresponding readings taken at Ehrenberg and at our intake, and was convinced that our river bed was rising annually.

Mr. Allison felt that the Federal Government should cooperate with us in the study and control of this gradually rising river bed. It was a problem that concerned not only the Palo Verde Valley but Cholla Valley, Colorado River Indian Reservation, and thousands of acres of Government land. Every jetty placed on the California bank was considered by our neighbors on the Arizona side of the river to be a menace to their land. During periods of heavy river discharges critical situations arose so suddenly that it was often impossible to secure permits for river-control work in time to save the valley from costly levee breaks. Mr. Allison felt that only with the Federal Government to authorize necessary river work could we hope to overcome opposition from various sources and save our valley.

In June, 1918, he went to Washington, D. C., for the purpose of petitioning the Federal Government to cooperate with us in our river problems and to defray one-half of the necessary costs. His requests were similar to those made by Imperial Valley in 1910 and 1914, at which time Imperial Valley received appropriations by joint resolutions of Congress. Mr. Allison's efforts to secure Federal aid, however, were fruitless.

In 1918 engineer Allison secured permission from Major Leeds, United States Army engineer, to do certain emergency work on the river; but in March, 1919, after the work was started, he was stopped by a restraining order issued by the Superior Court of Yuma County, Ariz. A costly levee break was the result.

During the winter of 1921-22 we were again confronted with a very serious situation—one that called for river-channel change before the coming of the annual flood.

This contemplated channel change was across low lands claimed by no one; it was across lands the boundaries of which were yearly changed by the erratic river itself. We were not permitted, however, to make this change which was so essential to our safety, and, in consequence, we experienced in 1922 the most disastrous inundation ever suffered by our valley.

After the flood of 1922 many of our farmers, broke and discouraged, were not only disheartened from repairing damage caused by the flood but a large portion of them ceased to pay taxes. This resulted in forcing approximately one-half of the taxpayers of the valley to carry the entire bonded indebtedness.

The rising of the river bed caused the land-water table of the valley to rise correspondingly, thus causing a drainage problem. In 1921 the Palo Verde drainage district was organized and bonds amounting to \$840,000 were voted and sold.

In order better to meet financial obligations, the Palo Verde Irrigation district was formed in 1923. This organization took over the property and assumed the liabilities of the water company, the levee district, and the drainage district. The Irrigation district now carries outstanding bonds amounting to \$4,301,000.

#### PRESENT ECONOMIC AND AGRICULTURAL CONDITIONS OF PROJECT

2. (a) Most of the land at the present time is held by private owners, less than half of whom reside in the valley and the balance in Los Angeles or other places. There may be approximately 10 per cent of the land which is now owned by the State for taxes and unpatented Government land.

(b) Eighty-nine thousand six hundred and ninety-three acres are within the boundaries of the district. Of this acreage approximately 78,000 acres are protected by our levees, and of this possibly 65,000 acres are susceptible of irrigation at the present time, and with a controlled river another 10,000 acres could be made available.

(c) Cotton is the main crop, with a value of from \$30 to \$150 per acre, depending upon price and yield. Alfalfa is the next crop in importance, yielding about the same gross revenues as cotton.

(d) The soil, if properly cultivated and watered, will produce from three-fourths to 1½ bales of cotton and from 4 to 9 tons of alfalfa per acre, although the average cotton yield throughout the valley is only about five-eighths bale per acre.

(e) Cotton is shallow cultivated from two to five times and is then "laid by" and only watered the balance of the season. Alfalfa is occasionally disked in the spring or fall, but mostly receives no cultivation.

3. Determined facts relating to resident farmers as follows:

(a) The district has a preponderance of poor farmers. Especially is this true of the tenant class. These tenants are mostly cotton pickers, both colored and white, who have had some landowner or cotton merchant finance them. As a general rule the man who farms his own farm is a fairly capable and experienced farmer.

(d) Practically no outbuildings are in existence on our farms. Most farmers live in tent houses and shacks. A small percentage of the farmer owners have good comfortable houses.

(f) This district is practically a 1-crop district (cotton). Every farm should have at least half of its acreage in alfalfa and other crops such as small grains, sorghums, orchard, and pasture and have a few cows and chickens.

4. From 40 to 80 acres.

5. Raw land can be obtained at from \$25 to \$50 per acre and can be secured on various terms, some ranging as low as \$5 an acre down and the balance \$5 per acre per year at 7 per cent interest—the purchaser, of course, to keep up taxes and assessments.

6. There is practically no present demand for land.

7. What capital is required to develop new land: (a) \$25 to \$50 per acre; (b) \$20 to \$100 per acre; (c) \$500 to \$2,500; (d) \$500 to \$1,500.

8. No source of credit is available for development of district at this time.

9. Cotton is purchased as soon as ginned by buyers from September to April. Most other products are marketed in Los Angeles either by rail (Santa Fe) or by truck over a good highway (250 miles).

10. Answered under No. 9.

11. (a).

Palo Verde Mutual Water Co.....	\$230,000.00
Levee district, first issue.....	933,951.86
Levee district, second issue.....	317,378.50
Drainage district.....	850,000.00

Irrigation district, first issue.....	\$1,715,000.00
Irrigation district, second issue.....	213,000.00
<b>Total.....</b>	<b>4,239,329.36</b>
Per gross acre.....	47.45
Per net acre.....	65.50

(b) No government obligations.

(c) Cost per acre operation and maintenance district assessments:

Best land.....	\$17.50
Average producing land.....	15.00

(d) Cost per acre for State and county taxes:

Best land.....	\$2.60
Average producing land.....	2.25

12. Reduction of assessments and tax cost to a total \$10 to \$12 per acre on the average producing land.

*Expenditures made for levee protection for years 1909-1928, inclusive*

	Construction and main- tenance		Total	Bond and interest		Total
	Levees	River straightening		Bond retire- ments	Interest	
1909-1913, inclu- sive.....	\$182,008.76		\$182,008.76			
1914.....	4,542.71		4,542.71			
1915.....	31,409.18		31,409.18			
1916.....	14,313.01		14,313.01			
1917.....	6,524.69		6,524.69			
1918.....	26,993.66		26,993.66		\$8,287.50	\$8,287.50
1919.....	290,514.14	\$76,345.21	366,859.35	\$6,000.00	15,600.00	21,600.00
1920.....	558,956.80	11,069.73	570,026.53	32,000.00	60,970.00	92,970.00
1921.....	132,363.92	3,551.06	135,914.98	32,000.00	67,112.50	99,112.50
1922.....	112,041.43	50,775.62	162,817.05	28,000.00	76,501.88	102,501.88
1923.....	195,730.36	224,369.73	420,100.09	41,000.00	42,620.74	83,620.74
1924.....	17,732.24	82,247.83	99,980.07	41,000.00	93,848.98	134,848.98
1925.....	110,980.50	96,062.84	207,043.34	41,000.00	97,911.38	138,911.38
1926.....	22,668.49	50,449.70	73,118.19	41,000.00	142,607.22	183,607.22
1927.....	17,389.90	27,641.29	45,031.19	41,000.00	86,851.48	127,851.48
1928.....	17,182.50	21,389.34	38,571.84	41,000.00	91,096.46	132,096.46
<b>Total.....</b>	<b>1,741,442.29</b>	<b>643,902.35</b>	<b>2,385,344.64</b>	<b>342,000.00</b>	<b>783,408.14</b>	<b>1,125,408.14</b>

RECAPITULATION

*All outstanding issues*

Year	Interest	Principal	Total	Year	Interest	Principal	Total
1928.....	\$264,321.48	\$71,000.00	\$335,321.48	1947.....	\$106,616.48	\$164,000.00	\$270,616.48
1929.....	258,856.48	71,000.00	330,856.48	1948.....	96,571.48	167,000.00	263,571.48
1930.....	255,391.48	71,000.00	326,391.48	1949.....	86,346.48	167,000.00	253,346.48
1931.....	250,926.48	71,000.00	321,926.48	1950.....	76,121.48	167,000.00	243,121.48
1932.....	246,461.48	71,000.00	320,461.48	1951.....	65,896.48	173,000.00	238,896.48
1933.....	240,526.48	113,500.00	354,026.48	1952.....	55,311.48	181,000.00	236,311.48
1934.....	233,256.48	122,000.00	355,256.48	1953.....	44,231.48	187,000.00	231,231.48
1935.....	225,476.48	130,000.00	355,976.48	1954.....	32,806.48	188,000.00	220,806.48
1936.....	216,586.48	159,000.00	375,586.48	1955.....	21,321.48	188,000.00	209,321.48
1937.....	208,068.48	133,500.00	341,568.48	1956.....	9,836.48	41,000.00	50,836.48
1938.....	199,616.48	152,000.00	351,616.48	1957.....	7,171.48	41,000.00	48,171.48
1939.....	190,636.48	160,500.00	350,536.48	1958.....	4,313.04	46,951.86	51,264.48
1940.....	179,691.48	182,500.00	362,191.48	1959.....	2,494.60	9,000.00	11,494.60
1941.....	168,026.48	199,500.00	367,526.48	1960.....	1,909.60	9,000.00	10,909.60
1942.....	155,596.48	211,000.00	366,596.48	1961.....	1,324.60	9,000.00	10,324.60
1943.....	146,796.48	164,000.00	310,796.48	1962.....	739.60	11,378.50	12,118.10
1944.....	136,751.48	164,000.00	300,751.48				
1945.....	126,706.48	164,000.00	290,706.48	<b>Total.....</b>	<b>4,433,785.84</b>	<b>4,327,330.36</b>	<b>8,761,116.20</b>
1946.....	116,661.48	164,000.00	280,661.48				

The Palo Verde Valley, with its soil conditions almost identical to such as exist in Yuma Valley and with a larger acreage that can be irrigated by gravity flow from the Colorado River, should have developed into a more populous community than its sister valley. Its failure to do so is due to the fact that its every effort to induce the Federal Government to cooperate in the control of the Colorado River has failed to get results. This cooperation has been extended to the citizens of Yuma Valley by our Government.

The home of the Palo Verde Valley farmer carries a bonded indebtedness, the interest of which, added to his yearly maintenance and operative burdens, is equivalent to a tax rate of 50 cents on the dollar (property assessed at one-third of its value). Because of this condition the Palo Verde Valley farmer has been discouraged from adding to this an additional tax by the acquisition of better homes and better equipment. He appreciates the fact that if his farm is to be kept in a high state of productivity he must diversify his crops; that dairy stock, hogs, poultry, etc., must, to a certain extent, be raised instead of cotton. These changes, however, call for additional expenditures, more taxes, and greater hazards in a valley still in danger of Colorado River floods.

The principal crop of the Palo Verde Valley is cotton; it is a crop that rapidly depletes the soil. It is, however, a poor man's crop; it is one which requires but little equipment and one on which money can be borrowed at any stage of its growth from the time it is planted to the time it is harvested.

The Palo Verde Valley has been assured by Mr. Seagraves, colonization agent of the Santa Fe Railway, that if our financial burdens could be reduced he then could and would colonize our valley with a desirable colony of farmers.

Twenty years of diversified farming, such as would build up instead of deplete our soils, would increase our taxable assets to a degree that would enable us easily to discharge our financial burdens. In the meantime the Boulder Canyon Dam would solve our silt problems, relieve us of the danger of floods, and assure us an adequate supply of water for irrigation. With these many helps we could in 20 years be one of the most prosperous communities of the West.

From 1912 to 1922 the farmers of the Palo Verde Valley suffered from a series of disastrous floods. The levee break of 1922 alone caused a damage exceeding \$1,000,000. It was so reported by Colonel Deakynne and Major Ardery, United States Army engineers. During all these years not a dollar's worth of Federal aid was obtained for the relief of our valley.

We feel that whereas the Federal Government assumes control of all other navigable rivers of the United States, and whereas it has been the policy of the Government to extend aid to such districts as have suffered severely from river inundations, that we are justified in petitioning the Federal Government to assume control of our levee system and to reimburse us for past expenditures for levees and river control.

#### QUESTIONNAIRE—WATER USERS, PALO VERDE IRRIGATION DISTRICT PROJECT

July 20, 1929

##### NATURE OF TENURE AND CAPITAL

1. Name, R. L. Babcock; post-office address, Rannells.
2. Owner or tenant, owner; date of settlement, 1919.
3. If owner, was land acquired by purchase or by entry? Purchase.
4. If purchased, what was the purchase price? \$125 per acre. How much down payment? \$2,000. On what terms is balance to be paid? Yearly installments all past due. What is the interest rate? 7 per cent. Have payments been made as due? No. If not, amount of payments now overdue? \$7,000.
6. How much capital did you have at time of settlement? Cash, \$5,000. Livestock and equipment, \$——; other assets, \$——; amount borrowed in each of first three years, \$——.
7. How much capital do you think a new settler should have? \$4,000–\$5,000. If credit is needed, where could he borrow? ——.

##### IMPROVEMENTS AND EQUIPMENT

8. List farm buildings, with cost of each: Dwelling, \$450; shed, \$100.
9. What additional improvements do you need? Stalk shed, tank and tank house, better home. Estimate cost, \$——.

10. Cost of farm machinery and equipment (list if exceptionally low or high), \$800 machinery, \$600 work.

11. What additional machinery and equipment or livestock do you need?  
\$\_\_\_\_\_.

## IRRIGATION COSTS, REPAYMENTS, AND TAXES

12. Total acreage of farm, 80; Irrigable acreage, 70. Area, class 1, 40 acres; class 2, 20 acres; class 3, \_\_\_\_\_ acres; class 4, 10 acres waste land; pasture or dry land, 10 acres; irrigated acreage, 1928, 70 acres; cropped acreage, 1928, 60; acreage prepared for irrigation, 1929, 70.

13. What was the cost of preparing the raw land for irrigation (including clearing, leveling, and ditching)? \$5,000.

14. Total amount of construction charge, \$\_\_\_\_\_.

15. Construction payments to date, \$\_\_\_\_\_.

16. Total operation and maintenance charge, 1929, \$\_\_\_\_\_.

17. Water rentals due for 1929, \$\_\_\_\_\_.

18. Amount of indebtedness other than mortgage, construction charge, and unpaid operation and maintenance and water-rental charges, \$\_\_\_\_\_.

19. Amount of taxes for last tax year: State and county, \$152; Irrigation district, \$972; other, \$\_\_\_\_\_; amount of these taxes, if any, that are delinquent, None.

## FARMING OPERATIONS AND INCOME

20. List principal crops grown on your farm in 1928, with gross value and value per acre:

Crop	Acreage	Yield per acre	Gross value	Value per acre
		<i>Pounds</i>		
Cotton.....	45	355	\$3,260.00	\$72.40
Alfalfa.....	18	2,200	594.00	33.00
All crops.....			3,854.00	

21. Was this an average year? No. If not, was it above or below average? Below.

22. What is your agricultural program for 1929? Raising alfalfa and cotton.

23. What changes would you make in your program if capital were available at 6 per cent? No changes while taxes are so high.

24. Do you feed all hay and forage to livestock or sell such crops? Feed.

25. What area of your farm is fertilized with barnyard manure each year? Four acres.

26. Where are your crops marketed? Cotton at the gin.

27. To what extent are they marketed through cooperative associations? None.

28. What was your net return from crops sold? \$1,016 after tax.

29. How many dairy cattle have you? Seven. Sheep, none; hogs, none; poultry, 150; stands of bees, none.

30. What was your income from each in 1928? Sale of cows and calves, \$270; dairy products, \$240; poultry, \$40.

31. What was your income from other farm operations in 1928? None.

32. Amount of income other than that from your farm? None.

33. What is most suitable size of farm for average farmer adequately financed? Eighty acres.

34. What suggestions have you to offer to improve conditions for yourself and for the community? We need long-time loans on land at low interest rates. Irrigation tax is much too high. Valley needs new settlers to develop the unimproved land.

R. L. BABCOCK.



July 25, 1929

## NATURE OF TENURE AND CAPITAL

1. Name, Carl A. Denk; post-office address, Blythe, Calif.
2. Owner or tenant, owner. Date of settlement, 1919.
3. If owner, was land acquired by purchase or by entry? Purchase.
4. If purchased, what was the purchase price? \$5,000. How much down payment? Cash.
6. How much capital did you have at time of settlement? Cash, \$——; live-stock and equipment, \$——; other assets, \$——; amount borrowed in each of first three years, \$——.
7. How much capital do you think a new settler should have? \$5,000. If credit is need, where could he borrow? Cotton brokers. How long would loan run? Length of crop year. Interest, 8 per cent.

## IMPROVEMENTS AND EQUIPMENT

8. List farm buildings, with cost of each: Dwellings, \$1,000; tank house and water system, \$300; outbuildings, \$100.
9. What additional improvements do you need? Better house, hog shed, and stock shed. Estimated cost, \$4,000.
10. Cost of farm machinery and equipment (list of exceptionally low or high), \$1,500.
11. What additional machinery and equipment or livestock do you need? New tractor equipment. Estimated cost, \$1,500.

## IRRIGATION COSTS, REPAYMENTS, AND TAXES

12. Total acreage of farm, 100; irrigable acreage, all; area class 1, 40 acres; class 2, 20 acres; class 3, 20 acres; class 4, 5 acres; pasture land, 15 acres; irrigated acreage, 1928, 100; cropped acreage, 1928, 80; acreage prepared for irrigation, 1929, 10 acres (new land).
13. What was the cost of preparing the raw land for irrigation (including clearing, leveling, and ditching)? \$500.
14. Total amount of construction charge, \$——.
15. Construction payments to date, \$——.
16. Total operation and maintenance charge, 1929, \$——.
17. Water rentals due for 1929, \$——.
18. Amount of indebtedness other than mortgage, construction charge, and unpaid operation and maintenance and water-rental charges, \$——.
19. Amount of taxes for last tax year: State and county, \$188.95; irrigation district, \$755.81; other, \$——; amount of these taxes, if any, that are delinquent, \$——.

## FARMING OPERATIONS AND INCOME

20. List principal crops grown on your farm in 1928, with gross value and value per acre:

Crop	Acreage	Yield per acre	Gross value	Value per acre
		<i>Pounds</i>		
Wheat.....	10	1,000	\$300	\$30
Alfalfa.....	20	12	500	50
Cotton.....	50	310	3,200	64
All crops.....			4,000	

<sup>1</sup> Tons.

21. Was this an average year? No. If not, was it above or below average? Twenty per cent below.
22. What is your agricultural program for 1929? Have double increased, rented land and 10 acres new graded land.
23. What changes would you make in your program if capital were available at 6 per cent? Grade more unimproved land and farm on larger scale.

24. Do you feed all hay and forage to livestock or sell such crops? Sell part of hay.

25. What area of your farm is fertilized with barn-yard manure each year? Five acres.

26. Where are your crops marketed? Cotton in Blythe; hay, grain in valley.

27. To what extent are they marketed through cooperative associations? None.

28. What was your net return from crops sold? \$240.

29. How many dairy cattle have you? Two. Sheep, none; hogs, 4; poultry, 250; stands of bees, none.

30. What was your income from each in 1928; sale of cows and calves, \$50; dairy products, none; hogs, none; poultry, \$300.

31. What was your income from other farm operations in 1928? \$——.

32. Amount of income other than that from your farm? \$——.

33. What is most suitable size of farm for average farmer adequately equipped and financed? Eighty acres.

Cost of farming operations, labor, etc.-----\$2,031.00

Cost of cotton picking-----787.00

Irrigation, State and county taxes-----944.76

Cost of feed-----300.00

Total-----4,062.76

34. What suggestions have you to offer to improve conditions for yourself and for the community? Only about one-third of land in valley is leveled and in crops. We need more good farmers with enough capital to put all in cultivation which would lessen the tax burden for everyone.

CARL A. DENK.

#### QUESTIONNAIRE—BANKERS, BLYTHE PROJECT

July 10, 1929

1. Bank, First National Bank.

2. Officer, William Monypeny, president.

3. As a result of your experience here, what is your view as to the credit needs of settlers:

(a) Do they as a rule have money enough of their own to make necessary improvements? No.

(b) Are the local banks in a position to furnish them the money they need for permanent improvements? No. On what terms?

(c) Are the local banks able to furnish them money for purchase of breeding stock or living expenses? To satisfactory risks. On what terms? On crop mortgages or chattel mortgages, 8 to 10 per cent.

(d) Is money available for feeding operations? Believe that farmers should grow major portion of their feed.

4. Do you think the present credit facilities are all that are needed? No.

5. Does the Federal land bank generally make loans on improved project farms? No (seldom). What do you suggest to make this an attractive field for such loans? Reduction in tax rate.

6. What capital do you think a settler ought to have to give him a fair chance to succeed? About \$15 to \$20 per acre above cost of land.

7. Has the bank ever been compelled to foreclose on farms? Yes.

8. If so, how many such farms do you hold in present and what is the acreage of each? Two farms, one 100 acres, one 40.

9. Are they being farmed or otherwise developed? Yes.

10. Have you constructed any buildings on them to induce purchase? No.

11. What do you contemplate doing in order to stimulate the sale of these farms to settlers? Rotation from cotton to alfalfa to increase productiveness of the land.

12. What terms of payment would you offer? Any reasonable terms—balance on mortgage not to exceed five years.

13. What do you regard the proper size of holding for an average settler inadequately financed? From 40 to 100 or 200 acres.

14. Do farmers generally fertilize a portion of their farms each year with barnyard manure? Very little manure here, due to lack of livestock.

15. Do farmers generally keep enough livestock to consume hay and forage grown on their farms? No. If not, what do you suggest to increase the number of livestock on farms or feeding operations? Proper education of the farmer as to the value of livestock and long-term financing to enable him to purchase same.

16. What suggestions have you to offer to improve conditions in this community and build up a permanent agriculture? Improvement of roads; more diversification of crops; more livestock; relief from high taxes through government or other agencies.

WM. MONYPENY.

QUESTIONNAIRE—BANKERS, PALO VERDE IRRIGATION DISTRICT PROJECT

*July, 1929*

1. Bank, Farmers & Merchants National Bank of Blythe, Calif.

2. Officer, supervisor, formerly vice president and cashier.

3. As a result of your experience here, what is your view as to the credit needs of settlers? Relief from heavy tax burden now being carried by them.

(a) Do they as a rule have money enough of their own to make necessary improvements? Not for several years.

(b) Are the local banks in a position to furnish them the money they need for permanent improvements? No.

(c) Are the local banks able to furnish them money for purchase of breeding stock or living expenses? Yes, on a basis of seasonal liquidation.

(d) On what terms? In case of crops, seasonal; in case of dairy, monthly payments from cream checks.

(e) Is money available for feeding operations? Yes—cattle-loan companies finance stock purchases; banks can help with financing feed.

4. Do you think present credit facilities are all that are needed? Not as to farm loans.

5. Does the Federal land bank generally make loans on improved project farms? No. If not, why? Withdrew several years ago because of high tax rate and drainage conditions; drainage has since been taken care of. What do you suggest to make this an attractive field for such loans? Refinancing the district's bonded indebtedness in such a manner as to materially reduce tax rate.

6. What capital do you think a settler ought to have to give him a fair chance to succeed? Depends entirely on acreage and character of operations.

7. Has the bank ever been compelled to foreclose on farms? Yes.

8. If so, how many such farms do you hold at present and what is the acreage of each? Three 80-acre; two 40-acre; one 38-acre; total, 358 acres.

9. Are these being farmed? Are being farmed and two 80 acres developed.

10. Have you constructed any buildings on them to induce purchase? No.

11. What do you contemplate doing in order to stimulate the sale of these farms to settlers? Assist in attempt to relieve the land of high tax; at same time get ranches planted to alfalfa.

12. What terms of payment would you offer? Have sold several on basis six small annual payments, interest, and taxes, balance on seventh year as minimum payments; up to 50 per cent net profits of ranch after all expenses, interest, and taxes are paid as maximum.

13. What do you regard the proper size of holding for an average settler? Forty to sixty acres.

14. Do farmers generally fertilize a portion of their farms each year with barnyard manure? Use green corn crops and manure, with some gypsum and commercial fertilizer.

15. Do farmers generally keep enough livestock to consume hay and forage grown on their farms? There will be an excess of hay this year for the first time. If not, what do you suggest to increase the number of livestock on farms or feeding operations? By increasing alfalfa acreage we will develop outside demand for feed and encourage feeding of range cattle and sheep.

16. What suggestions have you to offer to improve conditions in this community and build up a permanent agriculture? Our bonded indebtedness is maturing in such a manner that it creates a very high tax rate and does not permit improving the land for permanent crops. Much of it is not sufficiently level for alfalfa and must be leveled. Very few ranchers have decent houses or barns and very few are properly fenced, with many not fenced at all. I

believe that a refunding of the bonded indebtedness on a reclamation basis will spread the payments out over a period of years that will enable the owner to use his income, partly at least, to improve the ranch and put it in crops that will rehabilitate the land as well as attract permanent farmers and purchasers. Cotton is the principal crop at the present time and is deteriorating the land badly. Rotation is very necessary. This land is very fertile and capable of a very high state of production and much more valuable crops than cotton, but money and new buyers must be attracted to bring it about. They will not come in under the present tax rate. Our valley has 90,000 acres of land which may be developed. By the remedy, I suggest that I have no doubt that buyers will then be interested in the raw land, will come in and develop it, increasing the district's ability to meet its obligations. Some of the present owners of unimproved lands will feel justified in improving their land and will pay up delinquent taxes. In my opinion, the Palo Verde irrigation district is fully capable of meeting its indebtedness and reducing its tax rate to the point where farmers and buyers of our land will come in, provided that the indebtedness can be met in an orderly manner and in reasonable amounts. The bonded indebtedness is not excessive under the latter condition.

D. B. LEONARD.

## MALTA AND GLASGOW DIVISIONS, MILK RIVER PROJECT, MONTANA

(By L. H. Mitchell, Superintendent Shoshone Project, Wyoming)

### CONCLUSIONS

1. In answer to the question, "Have the economic and social benefits of this project justified its construction?" the commissioners of both districts answered "No." The writer agrees, and furthermore suggests that the bureau be cautious as to further expenditure.

2. The best land, classes 1 and 2, if farmed properly (not wait for rain) will produce crops comparable both in quality and quantity with any of the northern irrigation projects. The poorer lands will require many years of careful handling before satisfactory crops can be raised. This land is, as a rule, the gumbo type. It licks hums and bakes badly after being irrigated. A large area of this land is, in some years, under water for several days during the spring floods. Some sections of the project are more liable to floods than others. From information obtained I would estimate that lands subject to floods are on an average damaged about one year in four. Such lands are best adapted for pasture and hay.

3. On the Malta division there are about 24,000 acres of classes 1 to 4 lands and on the Glasgow division about 15,000 acres. (These areas are the findings of Assistant Reclamation Economist E. R. Fogarty.) About one-half of this area, for the Malta division, is being irrigated, and about one-third of the Glasgow division. It is therefore estimated that 12,000 acres on the Malta division and 10,000 acres on the Glasgow division in classes 1 to 4 are not being irrigated and are undeveloped. Under present agricultural conditions and with the unfriendly attitude toward irrigation, I can not recommend that the Bureau of Reclamation use funds of the United States to secure settlers for this project. It may require several years for the present land owners and business people to "sell the project to themselves." Until a big majority of the local people are boosters for irrigation there is little hope of finding an outside settler with sufficient capital to develop a farm of unproductive land who will undertake this venture and wish to make a home there. If some plan of "pay O. and M. and water rental or have land sold for taxes" is carried out the good unproductive land will, it is believed, slowly become developed. If this does not bring about the much-needed better farming, there is, in my opinion, only one solution, namely, for the United States to put no more money in the project and play a waiting game until conditions change.

4. Delayed settlement has been affected by—

(a) *Defects in soil.*—The soil conditions are about the same for both divisions. An examination of the soil-classification map clearly shows the spotted condition of the various soils. It also shows the various types of soil. This soil classification was made under the supervision of the State Agricultural Department of Montana. The low-producing soil with poor farming does not

give the appearance of prosperity. This will delay settlement anywhere and may result in some good settlers leaving.

(b) *Climatic conditions.*—The entire Milk River Valley has the reputation of having long, cold winters. It is my opinion the winters are not too severe for profitable stock raising, especially sheep. The severe winters would be much less harmful if all parties interested would "shout" about the good weather (generally speaking, the falls are perfect) and not give a cold spell the usual publicity.

(c) *Lack of capital on part of settlers.*—The value of all livestock and equipment for the Malta and Glasgow divisions is approximately \$720,000, or only \$10 per irrigable acre. On this basis a 100-acre farm would have \$1,000 invested in stock and equipment. To be successful the settler should have stock and equipment valued at not less than \$2,000 for a 100-acre farm.

(d) *Lack of credit.*—The present settlers are unable to obtain credit for farm development, except in a very limited way. The local banks will make only short-time loans at 10 per cent interest on chattels for security. The Agricultural Credit Corporation, of Minneapolis, has made a few livestock loans.

(e) *Mosquitoes.*—The present flood system of irrigation and the lack of surface drains (the country being very flat) makes an ideal place for mosquitoes, especially in years of heavy rains. During the mosquito season (two months) the dairy business is often operated at a loss.

5. If the present low-crop returns do not increase materially by 1931, with the joint-liability feature covering a large area of very questionable soil, it is not believed possible under present agricultural conditions for the districts to pay the \$57 per acre construction charges in 40 years. The 1928 average crop return was less than \$14 per acre, and very few crops can be produced at this cost per acre. To insure the cultivation of land delinquent in taxes, the districts must proceed in good faith to carry out the true intent and purpose of the provisions of the contracts regarding "increase in assessments to cover tax sale deficiencies." When the landowners once understand that all irrigable lands must pay operation and maintenance, water rental, and construction charges, it is believed the cultivation and development of all lands that, under reasonable irrigation farming practice will produce paying crops, will be orderly. The district commissioners have not had an opportunity to carry out the plan of "eliminating those who will not pay water charges by obtaining tax deeds and reselling to some one who will develop the land." While it is believed advisable for the Bureau of Reclamation to have authority and funds to acquire title to lands through purchase of tax certificates, it is my opinion the United States should go very slow in the purchase of such certificates on the Milk River project.

6. Rapid and complete project development can not be fulfilled until—

(a) There are more settlers and likewise smaller holdings.

(b) Livestock on the farm is the principal type of farming and not a side line. This will require credit which is not available for either purchase of stock or proper shelter. The local bankers were interviewed on the subject of financing this important enterprise, and, while all agreed livestock was very necessary for the success of the project, they advised that the banks were not making loans for this purpose. The project banks are large stock-ranch institutions. They will, however, loan for short time at 10 per cent on chattels at about one-half the real sale value.

(c) Low-producing lands due to poor soil and topography are excluded from the operation and maintenance and construction charge payments. This does not mean that the good lands can not pay the cost of operation and maintenance, or that such pay class lands should be relieved of construction payments.

If any one of these important matters is not carried out promptly, success is indefinite. More settlers will be hard to locate until credit is available for financing the stock-feeding type of farming. Whatever agency loans money for this purpose on this project should act slowly and cautiously.

7. *Additional construction work.*—As the actual irrigated acreage increases it may be necessary to provide additional storage works. This is well provided for under paragraph 30 of the district contract. Both districts are aware of the necessity for drainage as the command for water increases. Fortunately, there is no great need for drainage at present. The Glasgow district commissioners mentioned the poor condition of the canals and structures and they are fearful considerable repair work will be necessary in the next few years. It is believed advisable for the United States to withhold making extensive repairs

on any works until it has been demonstrated that there is a fair chance that the money will be returned. Such repair work as is necessary should be paid by the districts as a maintenance feature. Flood control was mentioned as a problem the United States should help solve. Possibly the War Department could be influenced to assist in building reservoirs. On the Glasgow division there was some expression that the Bureau of Reclamation should straighten the channel of the Milk River to prevent flooding. Irrespective of the merit it is not considered advisable for the United States to use any funds that are expected to revolve in preventing floods on this project.

8. Under present agricultural conditions it is not believed advisable to farm and develop any lands of the Milk River project other than the good productive soils. Such unimproved lands can be purchased on favorable terms for about \$10 per acre for the low-grade lands to \$35 per acre for the choice. To bring this land to full production will cost from \$2 to \$10 for ditches and leveling in addition to the cost of soil building. Nearly all of the unimproved lands have been poorly farmed. It will require a few years of crop rotation, wood eradicating, and the application of some fertilizer to bring these unimproved lands to full production. Just how much this will cost per acre depends upon the soil and topography. It is my opinion one should have available not less than \$10 per acre for developing the land. To properly develop a 100-acre farm one should have credit for the following:

Equipment-----	\$1, 200- \$1, 500
Buildings and fences-----	2, 000- 2, 500
Livestock-----	2, 000
Purchase price of land (down payment)-----	500- 1, 000
Ditching, leveling, and contingencies-----	1, 000

Without crop failures, sickness, and depriving one of some of the necessities of life a less amount of cash or credit might be sufficient.

9. Settlers with sufficient capital to develop an irrigated farm anywhere are very scarce. With the few unfavorable conditions as heretofore outlined in paragraph 4 to overcome, it may be some years before credit is available from any source. Until conditions change, in my opinion, this project is not one where the United States should take an active part in loaning money to settlers for buying livestock or permanent improvements.

10. On this project the county agents, with assistants, are doing much to help settlers solve problems pertaining to what crop and acreage to grow, marketing, control of animal and plant diseases, etc. Due to the field of operations being much too large for the present small organization, it is the consensus of opinion of the district commissioners that the county agent should have several more good assistants, the expense to be paid by the Agricultural Department. I concur, except that the project settler should pay a part of this cost, in order that he may appreciate the real value of such service.

11. *Should reclamation continue?*—In Montana, especially the northerly and easterly portions, it is doubtful if further construction work should be carried on by the Bureau of Reclamation for some time, for the following reasons:

(a) Farming on the bench lands is fairly satisfactory under the summer fallow system of farming, thus making irrigation farming unpopular.

(b) Lack of appreciation on the part of many people in the State as to what the United States has been and is doing in building expensive irrigation works.

(c) *Lack of right-thinking leaders.*—It is not meant by this that the State has not right-thinking people. However, during my 18 years on the Lower Yellowstone project I have heard many politicians (some elected to the United States Senate) make speeches of repudiation. During the recent inspection trip the writer could still see the desire of "extracting all possible from the United States Treasury and return very little."

12. In a few words I would summarize and recommend the following:

(a) The land classification made in 1925 was under rules to determine a basis of repayment of construction charges on a crop-return contract. Had this been adopted in place of a 40-year plan, the classification would have been equitable. The writer made field examinations of tracts in class 4 under the crop-payment rule, and upon comparing these tracts with the soil classification recently made by the State of Montana, and further reviewing the recent classification made by Assistant Reclamation Economist E. R. Fogarty (Mr. Fogarty was employed in 1927 on some soil classification in Wyoming, Shoshone

project, and I found his work very reliable) can strongly recommend the approval of his classification, which follows:

Division	Classes 1-4 pay lands	Question- able classes 3 and 4	Class 5	Class 6	Total
Malta.....	20,661.7	10,365.0	21,548.5	1,772.2	54,347.4
Saco.....	3,235.6		9,564.1	328.2	13,127.9
Glasgow.....	14,865.6	342.3	4,581.9		19,789.8
Total.....	38,762.9	10,707.3	35,694.5	2,100.4	87,265.1

<sup>1</sup> Saco excluded.

(b) The county and State taxes on the poor producing lands are not equitable. Adjustments should be made by the county assessors if Congress approves of a reclassification.

(c) There should be some incentive to hasten the time when the districts will take over the care, operation, and maintenance of the irrigation works. Possibly Congress would consider favorably some plan of making the new classification contingent upon the districts taking over the operation and maintenance of the project works.

(d) It is very evident one can not support a family and pay water charges on 160 acres of the poor lands. A large area, at least 25 per cent of the irrigable acreage, is adapted only to pasturage or hay meadows. It is suggested the law pertaining to limit of irrigable area held by one person be amended, giving the Secretary authority to make the maximum area for which one can have a water right under conditions similar to those on the Milk River project, 640 acres.

#### Key to soil classification map

Series	Description
Havre loam.....	First-class sandy loam.
Havre silt loam.....	Good soil.
Havre silty clay loam.....	A heavier soil than Havre and more difficult to handle.
Harlem silty clay loam....	A heavy soil that is quite productive. Needs surface drainage in many places. Requires special handling.
Havre fine sandy loam....	Light in texture, low in organic matter. Subject to flood during high water; generally needs leveling; can be made productive soil with proper treatment.
Harlem clay.....	Too heavy for farming; can be utilized for hay only, which will not pay maintenance and construction of irrigation. Temporarily nonproductive at least.
Harlem exceedingly heavy..	Locally termed gumbo. In most cases the location of this soil does not lend itself to surface drainage. Largely remains in native blue joint, except for comparatively small areas broken out. A difficult problem exists in regard to development of this soil in the Milk River Valley. Surface drainage and protection from flood water are necessary. Not recommended that special crops, such as beets and potatoes, be grown until this soil is somewhat subdued. In my opinion this is temporarily nonproductive at least.
Laurel clay.....	Same position as Harlem clay.
Laurel fine sandy loam....	Alkaline and poorly drained; nonagricultural.
Laurel silty clay.....	Drainage in this area is a factor that must be considered before development can take place. Other areas have fairly high alkali content, subject to overflow and standing water. Limits its use for agricultural purposes under present conditions. A little more desirable than Laurel Clay No. 60.



Series	Description
Wayne clay loam-----	Scabby nonagricultural. Excess salts and drainage problem. Low grazing value.
Cheyenne fine sandy loam--	Good soil type. Requires humus building. Soil blowing a problem.
Cheyenne loam-----	A good soil type.
Cheyenne gravelly loam----	Too much gravel for farming except for hay and pasture.
Tripp fine sandy loam-----	Same as Cheyenne fine sandy loam.
Pondera loam-----	A fair soil but largely nonirrigable.
Scobey loam-----	Do.
Scobey gravelly loam-----	For the most part nonirrigable; used for grazing purposes. Gravel content makes it difficult to plow or cultivate.
Phillips loam-----	Marginal.
Broken lands-----	Brakes bordering the stream courses; entirely untillable; only value is for grazing.
Nonirrigated-----	Large part of it suitable only for grazing purposes.

## OUTLINE OF ECONOMIC SURVEY, 1929

1. *History.*—(a) Preliminary surveys started in 1902. Construction work authorized conditionally in 1903. Actual construction commenced in 1906. The private landowners, who were stockmen and accustomed to raising hay by flood irrigation, interested the Reclamation Service in this enterprise.

(b) A greater portion of landowners obligated through water users' stock subscriptions and trust deeds their holdings for the repayment of construction costs before construction began. Not until 1926 were any contracts made providing for the repayment of a definite amount.

(c) A large per cent of the land was in private ownership. There were some Government and State lands.

(d) Other than the old-time settlers, there never has been a real settlement movement. In 1910 probably most of the vacant Government land was entered. The price of the land never has been high, as it has never produced crops to justify one paying very much for the land. The poor land is high at any price.

(e) The first water delivery was in 1911. Water has always been sold on a rental basis, varying from \$1 to \$5 per acre-foot.

(f) The returns from rentals of water during the rental period to December 31, 1925, did not pay the cost of operation and maintenance by \$441,568. The estimated operation and maintenance deficit for the years 1920 to 1929, inclusive, is \$107,000. (See item 2, par. 8, of contract with district.)

(g) Contracts with Malta and Glasgow irrigation districts provide for the construction repayments on a 40-year basis, to start in 1932. Beginning 1930 districts pay entire operation and maintenance costs. While the districts have not sought amendments to the contracts recently completed, the commissioners, in answer to the question, "Can the irrigation payments required under present conditions be made?" answered—(Glasgow) "Emphatically, no." (Malta) "Conditions will have to change."

2. *Present economic and agricultural conditions.*—(a) The following shows status of land holdings:

	Malta division	Glasgow division
Holdings with—		
Less than 80 acres-----	129	64
From 80 to 160 acres-----	174	51
From 160 to 320 acres-----	30	11
From 320 to 1,000 acres-----	18	9
Over 1,000 acres-----	6	4
Total-----	357	129

Those not living on the land consist in the main of large stockmen and people who live in the vicinity of the project.

(b) The irrigable area of the Malta and Glasgow divisions is 72,455 acres. This is the area for which water is available.

(c) The following is taken from the 1928 crop reports:

Crop	Irrigated acreage		Value per acre	
	Malta	Glasgow	Malta	Glasgow
Alfalfa hay.....	3,195	2,053	\$14.14	\$15.07
Alfalfa seed.....	26	117	19.20	14.45
Barley.....	133	23	16.53	8.55
Beets.....	742	58	63.80	84.57
Flax.....	22	18	15.41	21.11
Carden.....	16	8	121.89	131.45
Native hay.....	5,661	1,086	6.76	5.88
Oats.....	197	98	13.16	15.60
Pasture.....	155	30	9.81	10.00
Potatoes.....	27½	4½	54.65	60.28
Potato seed.....	19		296.05	
Wheat.....	981	1,298	14.76	11.00
Average per acre.....			13.82	15.15

(d) The good or fair lands (classes 1 and 2) under proper methods of farming will, in my opinion, produce at least double the present returns. This was demonstrated by a few good farmers. The poor lands should be used for sweet-clover pasture and native hay.

(e) As clearly shown under 2 (a) and the data under crop reports, too many are farming large areas and naturally are receiving low per acre returns.

3. *Resident farmers.*—(a) Fifteen farmers on the Malta division and six on the Glasgow division were interviewed and the regular water users' questionnaire was completed. Of these 21 farmers only 4 were conducting a type of agriculture that brings satisfactory results and 3 of these 4 were either feeding stock or milking cows. These successful farmers were capable, had experience, and were farming a much smaller area than the average. An examination of these questionnaires, with other facts, leads me to the conclusion that 50 per cent of the resident farmers have sufficient experience and capability to succeed, but other important factors prevent satisfactory progress.

(b) The first cost of farm, remaining indebtedness, rate of interest on deferred payments, for the 21 farms considered varies materially. Ten were the original entrymen. Four paid cash at time of purchase or have paid out (one of these paid \$1,000 for 480 acres; another purchased a farm of 290 acres, of which 90 are irrigable, for back taxes and mortgage amounting to \$2,000). Two are renters, five have contract for deed, with \$25,500 remaining to be paid. The interest rate is from 5 to 10 per cent on these debts.

(c) The total or other debts amounts to \$12,000, or an average of \$571 per farmer, and the rate of interest on this debt is 10 per cent.

(d) Of these 21 farmers, the estimated value of farm buildings per farm was (Malta) \$2,500, (Glasgow) \$2,000; the equipment was valued at (Malta) \$900 and (Glasgow) \$2,500. The reason for such high equipment value for the Glasgow division is due to combines and tractors being used to farm large holdings. It is of interest also to note that on the Glasgow division the value of equipment is in excess of the buildings. Generally speaking, both buildings and equipment are for large farming operations, comparable to nonirrigation farming.

(e) To divide the large holdings into smaller farm units means more buildings, likewise equipment. This would require an investment of about \$4,000 for each 100 acres. New settlers with this amount of cash or the equal in stock and equipment are not to be found who would settle on the Milk River project.

(f) In 1928, out of 72,455 acres for which water was available, only 15,832 acres were actually irrigated, the remaining area being either dry farmed or not farmed at all. While a large area has too poor soil to justify farming under present conditions, there is no real good reason for the dry-farming system. More intensive tillage, with irrigation and the raising of high-priced crops and feeding to livestock, is required.

4. *Size of holding for average farmer adequately financed.*—The 21 settlers interviewed on this subject had vastly different opinions as to this acreage, varying from 40 to 640 acres. Three banks' views were 160, 120, and 160 acres.

The consensus of opinion for all on this subject is 170 acres. Like on the Chinook division the writer believes 100 acres is all the average family can farm to best advantage. It was interesting to notice the most profitable farmer was the one who thought 40 acres was enough and only one had the 640 idea and he had in mind a farm with gumbo (class 5) soil. In my opinion the low-producing lands should be used for hay meadows and pasture with more sweetclover, and with this type of farming one should have at least 320 acres.

5. *Price of land.*—The price of raw land varies from \$10 to \$25 per acre. Many options have been obtained at these prices on the following terms: 10 per cent down, balance in 20 years at 6 per cent interest on deferred payments. Knowing these lands are poor producers the Great Northern Railway and the bureau have not advertised these lands very extensively. Good improved farms are valued at from \$25 to \$100 per acre, depending upon location and improvements, and upon same terms as the poor lands. There are very few such farms listed for sale.

6. *Demand for land.*—While there have been, during the past three years, several transfers among local people, there is now little demand for irrigated lands. Local landowners do not take kindly to the plan of having the land subdivided with buildings thereon ready for occupancy. Neither do the local banks favor loans for this purpose. In fact, one desirous of settling on a Milk River irrigated farm without at least \$3,000 in assets has very little chance to succeed. The poor lands are high at any price. In my opinion very little land has reached a stage of productivity that warrants a price to exceed \$50 per acre.

7. *Capital required to develop a farm.*—(a) To purchase land one should have at least \$1,000, of which from \$300 to \$500 would be for down payment and balance for second and possibly third year payments.

(b) Very little ditching or leveling has been done and fortunately very little other than along the river is required. The cost of this work would vary from \$1 per acre for the best land to \$10 per acre for some of the sandy lands near the river.

(c) The cost of suitable buildings, stock fences, and a domestic water supply would be about \$3,500.

(d) A full set of farm equipment, not including work horses would cost from \$1,000 to \$1,500.

8. *Source of credit for development.*—The local banks are loaning for short periods at 10 per cent interest with chattels for security and are loaning about 50 per cent of their actual value. The Utah-Idaho Sugar Co., when very necessary, will loan money for beet labor at 8 per cent interest. The Agricultural Credit Corporation of Minneapolis has made a few loans for purchase of livestock and their loans are popular.

9. *Markets.*—All wheat is shipped to eastern markets (Twin Cities). Barley, oats, and corn are used locally. Beets are sold to Utah-Idaho Sugar Co. with factory at Chinook. The hay market is very unsatisfactory to those without stock. With an open winter there is very little demand, while in hard winters there is a fair price. The wheat farmers must compete with the nonirrigated farms, which covers a large territory, including Canada.

10. *Transportation.*—The project is traversed through its entire length by the Great Northern Railway and transportation facilities are favorable for rapid development.

11. *Financial obligations of districts.*—(a) Neither district has a bonded indebtedness.

(b) The contracts with the Government obligate the districts to pay the United States \$57 per irrigable acre, payable in 40 equal annual payments or \$1.42½ per acre yearly, beginning in 1932. (Par. 12 of contract.)

(c) The operation and maintenance charges for 1929 are made up of a 50 per cent per acre charge payable as taxes and an additional \$1 per acre-foot charge. For more than 1 acre-foot the excess water costs at the rate of \$1.50 per acre-foot. (See par. 19 of contract.) The same amount is due for the year 1930. (See par. 20.) In 1931 the amount payable through the county machinery is 75 per cent per irrigable acre, the other charges being the same amount as in the year 1930. Beginning in 1932 and thereafter, the districts are required to pay the actual operation and maintenance cost. (See par. 23 of contract.)

(d) In Phillips County the assessed valuation of land, 1929, was as follows:

Irrigated land:	Per acre
First class.....	\$50. 00
Second class.....	40. 00
Third class.....	25. 00
Fourth class.....	17. 50
Fifth class.....	10. 00

Grazing land: \$5 to \$3 per acre.

Nonirrigable tillable: \$12 to \$6 per acre.

It is obvious that the poorer classes of irrigable lands are assessed far above what they should be when comparing the producing value with other lands of the vicinity. Very little, if any, of the class 5 lands are worth more than grazing lands. A large amount of the class 4 lands will not pay operating expenses.

11. *Concessions by creditors of districts.*—While no construction charges are due from either district until 1932, the commissioners are very much concerned over the probability of a large acreage going delinquent. They contend more land should have been in class 5. As water has, unfortunately, always been, until recently, delivered on a rental basis, the unit holders have not been concerned in knowing the exact acreage irrigable in their farms. Therefore no real surveys to find the actual irrigable area were requested by the settlers until it recently dawned on them that payments, both for operation and maintenance and construction would, in the near future, have to be paid like other just debts and like county taxes on the irrigable area. Apparently few settlers realized the object of the soil classification conducted under the act of December 5, 1924. Some settlers were more interested in selling their places than in a fair classification, and used their influence all possible to have their land classed so as to help sell it, and not on the assumption that it would pay construction charges.

However, had the districts contracted on the 5 per cent crop-payment plan, the present classification would have been fairly satisfactory.

An examination of some class 4 land clearly shows that under present agricultural conditions it will not produce crops for the owner to live and pay the fixed charges. If the good lands can, under the joint-liability contract pay all the charges, it will be necessary to produce more per acre.

*Valuable information pertaining to Malta and Glasgow division of Milk River project, Montana*

	Malta	Glasgow
Acreage irrigated, 1928.....	11, 074	4, 758
Value of crops.....	\$148, 760	\$62, 440
Value per acre.....	\$13. 43	\$13. 17
Both divisions		
Additional acreage dry farmed.....		19, 100
Value of crops.....		\$191, 300
Value per acre.....		\$10. 02
Value of livestock.....		\$481, 825
Value of farm equipment.....		\$239, 450
Number of irrigated farms.....		160
Farmers with poor crop results.....		50
Farmers with fair crop results.....		58
Farmers with good crop results.....		28
Farmers with excellent crop results.....		24
Total construction cost (United States).....		\$4, 736, 688
Construction charge per acre.....		\$57

## GREENFIELDS DIVISION, SUN RIVER PROJECT, MONTANA

(By H. H. Johnson, Superintendent Milk River Project, Montana)

### INTRODUCTION

The Greenfields division of the Sun River project comprises an irrigable area of 93,031 acres, 41,975 of which are now under constructed works, located in north central Montana, about 35 miles westerly from the city of Great Falls. Water supply is obtained from the Sun River, and with the storage just com-

pleted is entirely adequate for present needs and probably for contemplated future extensions up to the maximum irrigable area of the division. An excellently constructed canal and distribution system supplying water to each farm of the project has been completed. Except for the Big Coulee division, comprising only 2,300 acres, the portion of the division under constructed works lies in a single compact body, approximately 6 miles in width by 8 in length. Soil and climatic conditions are particularly favorable to the production of those crops adapted to the northern portion of the United States. The average elevation over the irrigable area is about 3,800 feet above mean sea level; temperatures vary from  $-40^{\circ}$  to  $100^{\circ}$  F., with an average frost-free period of about 130 days. The average rainfall during the past 37 years has been about 12.5 inches, with a maximum of 18 inches during 1927.

#### CONCLUSIONS

1. That the economic and social benefits of this project have justified its construction.

2. That the success of the Greenfields Irrigation district lies in the development of the lands now partially cultivated and the rapid colonization of the idle lands.

3. That soil and climatic conditions, marketing, and transportation facilities are favorable to a rapid and substantial development of the project.

4. That the general practice of wheat production on an extensive scale should be replaced by more intensive farming and the production of feed and forage crops, with livestock as a major industry.

5. That the production of sugar beets as an important crop in the farm program should be encouraged.

6. That practically all of the land is sufficiently productive to justify settlement under present agricultural conditions.

7. That to insure the prompt repayment of the annual construction charges there should be approximately 200 additional settlers upon the project.

8. That settlement is delayed at the present time to some extent by the lack of advertisement of the project's resources and the lack of something definite to offer settlers in the way of purchase contracts.

9. That under agricultural practices adapted to this project the proper size of a farm unit should be around 160 acres.

10. That the investment in land, improvements, and equipment required to bring a raw farm of this size into full production is about \$10,000. To guarantee his success a new settler should possess at least \$2,000, and credit of not less than \$3,000 should be available during the next three years for a term of not less than 10 years at 6 per cent interest.

11. That new settlers with necessary capital are difficult to obtain and that no source of credit is available for development purposes, nor are present landowners as a rule willing to invest additional capital in the improvement of their holdings for sale.

12. That to secure rapid development of the idle and partially improved lands and encourage rapid settlement, financial assistance on terms which are feasible should be made available to worthy settlers.

13. That under present agricultural conditions and conditions as they can be foreseen the lands can pay the taxes and water charges without jeopardy to the success of the individual farmer, provided development and settlement of the project advances to the point where delinquencies will be reduced to the minimum.

14. That with these conditions fulfilled the Greenfields Irrigation district should be successful and its obligations to the Government under the existing contract promptly and completely fulfilled.

*It is recommended.*—1. That the Irrigation district board, local agencies, and individual farmers use their efforts in bringing about a general improvement in agricultural and irrigation practices, in order that productive ability of the lands may be more fully realized.

2. That 2-year options be secured upon the lands for sale which provide reasonable valuations and terms of payment much the same as granted by private landowners of other projects, in order that something definite may be offered to prospective settlers.

3. That effort be made in the next session of Congress to obtain the passage of legislation which will make possible the financial assistance of worthy settlers upon reclamation projects through Federal agency.

## GENERAL

*Historical.*—The project was first investigated during 1903, recommended for construction in 1910, and construction started in 1913. Work progressed at a fairly rapid rate until 1915 and 1916, which were exceptionally wet years, and an excellent wheat crop was produced without irrigation. The settlers felt that there would be no further need for irrigation and that the repayment of construction costs would be an unwarranted burden. As a result the program was restricted to the first unit of 25,000 acres, which was completed during 1918. The dry period following 1916, the high war-time prices for farm produce, and the resultant demand for land revived interest in irrigation, construction was resumed, and distribution system for the second unit completed in 1923, making water available for the present irrigable area.

Due to senior vested rights upon Sun River and inadequate storage facilities for both the older Fort Shaw division and the Greenfields division, the water supply was found to be somewhat uncertain during dry years, limiting to a great extent the development of an intensive agricultural program. Following the investigations of 1924 and 1925, the construction of a storage dam in Sun River Canyon, the enlargement of the Sun River slope canal, and reconstruction of a portion of the canal upon a more stable location was authorized to guarantee an adequate water supply and reduce operation hazards, provided the water users would organize an irrigation district and enter into a valid contract to repay construction costs. The district was formed, the contracts executed on June 22, 1926, the storage dam has just been completed, and the canal reconstruction is now under way.

Up to the present time water has been delivered on a rental basis at reasonable rates and repayment of construction costs has not started. The provisions of the 1926 contract will not become effective until the construction work now in progress has been completed, which will probably be during 1930. The appropriation act for the fiscal year 1930 provides that the irrigation district will take over the operation and maintenance of the project on January 1, 1931, and commence the payment of construction charges. While the construction cost will ultimately be in the neighborhood of \$100 per acre, repayment will be made on the basis of 5 per cent of gross annual crop over the past 10-year period. With the assurance therefor of an adequate water supply at a very reasonable cost, nothing apparently stands in the way of the economic success of the project, provided better development and more intensive settlement of the irrigable area can be obtained.

*Original land status.*—Previous to reclamation withdrawals about 17,700 acres of the project area were in private ownership, embraced principally within desert-land entries, encouraged by the contemplated construction of a canal system by private enterprise. The balance of the division was unentered public land, with a relatively small area of State school land.

Homestead entries under the provisions of the reclamation act began in 1910; little land, however, was sold at this time and settlement progress was slow. Until 1913 the principal transfers were by relinquishments or assignments of homestead entries at comparatively low prices. Induced by good crops of 1915 and 1916, the effect of the World War on agriculture, and the partial completion of the irrigation system, there was a decided movement in projects lands, reaching the peak during 1919 and 1920, when prices had advanced to from \$50 to \$100 per acre, depending upon improvements, but with no equity in the water right. With the agricultural depression following the war came the usual deflation in land values, and lands can now be purchased at from \$25 to \$50 per acre.

*Operation and contract status.*—The first delivery of water was made in 1919 to 25,000 acres of the first unit. During the period of operation the revenue from water rentals has not paid the operation and maintenance cost, and at the present time a deficit of about \$69,500 exists, which will be funded with construction debt. Individual delinquencies amount to about \$7,000, which are being rapidly liquidated, and will probably be completely satisfied before the district assumes operation of the canal system. The cost of operating the canal system at the present time does not exceed 50 cents per irrigable acre.

Although the contract executed in 1926 is not yet in effect, the irrigation district board and the individual water users feel that its provisions can be fulfilled. No amendments are contemplated at present, although the district board does desire that the bureau retain charge of the main canal for a few years subsequent to 1931, or until the new work has been thoroughly primed and tested.

## PRESENT ECONOMIC AND AGRICULTURAL CONDITIONS

*Status of land.*—The present status of land is shown by the following tabulation:

TABLE I.—*Status of land ownership*

	Acres
Public land entered.....	\$17,733
Public land unentered.....	5,298
State land unsold.....	1,187
Private land.....	17,757
Total.....	41,975

In the above tabulation the private land includes desert entries, State land sold, and original private holdings. The desert entries are subject to the reclamation act; the original homestead entries were made usually on the maximum 160-acre tracts prior to the preparation of farm unit plats and are now subject to reduction to one farm unit. The unentered public land is comprised in 80 farm units, which will be opened for entry within the next two years.

Three hundred and thirty-five project farms cultivated during 1928 were operated by 145 resident landowners and 37 nonowning tenants. Many of these owners and lessees attempted to farm not only their own tracts but also one or more farms either under individual or public-land lease. Of approximately 90 nonresident landowners, 50 residing within the State are either individuals or corporations who have acquired the lands through mortgage foreclosure or for speculative purposes and either can not or do not desire to farm. The 40 non-State residents, scattered over the country, are of practically the same status as the Montana owners. While in most cases the farms held by nonresidents are for sale, no definite program has been formulated for their disposal to bona fide settlers. The lands are mostly unpatented; hence no land tax has been levied, neither construction or operation and maintenance charges are yet due, and the lands which are cultivated have been leased with the lessee paying rental charges if water was used. It cost the owners nothing, therefore, to carry the lands provided they are free from mortgage encumbrance, and there has been no particular incentive to sell. The tendency has no doubt been rather to wait until a general improvement in agricultural conditions would cause an increase in the demand for land, with a resultant higher price level generally. While many of the nonresident landowners would no doubt sell their holdings at reasonable prices and terms, there has been no general advertisement of property for sale, nor any plan formulated for the disposal of such lands. It is essential to the success of the project that some method be devised for the sale of the idle or partially cultivated lands to settlers who will carry on their improvement to a point where maximum production will be yielded in order that the payment of irrigation costs may not be burdensome and the individual delinquencies reduced to the minimum.

*Soil conditions.*—A highly productive and fertile type of soil exists over the project generally, varying from a silt loam to a gravelly loam, practically all capable of cultivation, with only a very few small areas of a refractory character. Almost the entire underarea is underlain with gravel, varying from porous well-drained material to a cemented structure in certain localities. Seepage has developed in a few areas, but these have all been protected by drainage, and as a rule the land which has become waterlogged is easily reclaimed when adequate drainage is provided.

As a rule the land is very level, with sufficient general slope to permit easy irrigation. Certain localities are gently rolling, and some leveling and preparation is necessary to facilitate irrigation and surface drainage. Generally, however, both soil and topography are well adapted to irrigated agriculture.

The following land classification, made by the University of Montana cooperating with the Bureau of Reclamation, is indicative of the general character of the project lands.

Class 1, 26,138; class 2, 11,095; class 3, 1,582; class 4, 2,632; class 5, 528; total, 41,975.

The class 2 land is inferior to that of class 1 in topography principally, while classes 3 and 4 have soil or topographic disabilities which render them less productive than the first two classes. Class 5 comprises all lands temporarily unfit for irrigated agriculture, principally on account of seepage.



*Crops.*—Up to the present time agricultural activity has been confined principally to forage and cereal crops, with about 70 per cent of the land given to the production of wheat, principally under dry-land methods. Due to the uncertainty of late summer water, the production of cultivated crops has been rather hazardous and little has been attempted along those lines.

The average production and value of the principal project crops during the past five years is shown by the following tabulation compiled from the annual crop-yield reports.

TABLE II

	Crop yields		Per acre, irrigated	Yield, dry
	Irrigated	Dry		
Alfalfa hay.....	1.7	1.1	\$14.50	\$9.70
Barley.....	20.0	19.0	15.00	14.81
Sugar beets.....	13.3	.....	85.75	.....
Sweetclover hay.....	1.6	1.1	6.00	6.00
Clover seed.....	5.5	.....	25.00	.....
Oats.....	25.0	17.0	15.25	10.60
Potatoes.....	88.0	100.0	81.00	84.00
Wheat.....	17.0	12.0	18.00	15.30

<sup>1</sup> 2 years only with small acreage.

<sup>2</sup> 3 years only with small acreage.

The average gross acre income from the lands of the project during the past 10-year period has been approximately \$16.

About 700 acres of seed peas have been planted this season, and at the present time an excellent crop is in prospect. This crop has been grown on similar projects in the Northwest and found to be satisfactory; however, the results upon this project are problematical. The production cost is not much greater than that of wheat, with a price guaranteed. An experienced agriculturist is maintained upon the project to advise upon culture and assist in the production of the crop, the supervision being practically the same as that given by sugar company field men. The revenue from the crop should be greatly in excess of wheat and, being a nitrogen fixer, tends to build up fertility rather than to impoverish the soil. The vines have a considerable feed value and, in connection with stock feeding, can be considered a dual-purpose crop in furnishing a cash product to replace a portion of wheat and at the same time assist in restoring soil fertility. There may be some doubt as to the extent of the market for this product; should this continue about stable and the crop prove adapted to the project, it will no doubt soon take an important place in the agricultural program.

The following tabulation shows the general trend of agriculture during the past five years:

TABLE III

Crop	1928		1927		1926		1925		1924	
	Area	Per cent of cultivated area	Area	Per cent of cultivated area	Area	Per cent of cultivated area	Area	Per cent of cultivated area	Area	Per cent of cultivated area
Wheat.....	20,384	66	10,705	67	18,147	69	18,257	73	18,308	72
Other cereals.....	2,319	8	2,549	9	2,171	8	2,166	9	2,030	8
Forage <sup>1</sup> .....	7,688	25	6,824	23	5,925	22	4,358	17	5,117	19
Miscellaneous and cultivated.....	142	1	130	1	123	1	125	1	113	1
Total.....	30,533	<sup>2</sup> 73	29,208	<sup>2</sup> 70	26,366	<sup>2</sup> 63	24,906	<sup>2</sup> 59	25,568	<sup>2</sup> 61
Irrigable area included.....	40,061	96	39,097	93	36,986	89	37,893	90	36,015	86
Area irrigated.....	7,856	19	7,032	17	15,958	36	13,012	30	13,736	33
Number of farms.....	355	.....	326	.....	315	.....	304	.....	293	.....
Number of farms irrigated.....	185	.....	148	.....	244	.....	221	.....	240	.....

<sup>1</sup> Includes sweetclover seed and pasture.

<sup>2</sup> Per cent of irrigable area.

An analysis of the above table shows a slight tendency toward the reduction of the acreage in cereal crops and a corresponding increase in forage crops. Although the past two years show a reduction in acreage irrigated, the actual area in crop was increased materially. Both 1927 and 1928 were years of high precipitation, especially during the growing season, and good crops were produced over northern Montana generally without irrigation. Had these been ordinary years, no doubt the acreage irrigated would have increased proportionately with the cultivated area, and it is not believed that this recorded decrease should be considered as an indication of retarded development.

*Ability of lands to produce.*—Apparently soil, climatic, and agricultural conditions generally adapt this project to the type of agriculture that is practiced at the present time, and with a guaranteed ample water supply there is no doubt but that the latent resources of the project will be developed and practices extended to include sugar beets or other cash crops suited to this locality. During 1915 and 1916, years of exceptional precipitation, 40 to 60 bushel wheat crops were not uncommon from lands which still retained their virgin fertility. However, continued wheat production has impoverished the soil and induced infestations of noxious weeds to such an extent that the productive ability of much of the land has been reduced to the point where unprofitable yields only can be obtained; such lands must be cleaned up and the fertility in some way restored. This condition has tended to increase the area in forage crops and advance the livestock program.

Summer fallowing of foul lands is being practiced to some extent, but with an ample water supply this merely means the waste of a year's crop, and is not a practice to be recommended upon irrigated projects. Sweetclover at the present time seems to be a most popular forage crop, since there is a feeling existent that the feeding value is comparable with alfalfa and the crop not as difficult to break up in the rotation scheme. The average yield of alfalfa has been light during the past, but this can no doubt be improved by greater care in irrigation and maintaining of the stand. Sugar beets were attempted on a very small scale, principally for experimental purposes, during 1925 and 1926 and an average yield of 13.3 tons per acre was obtained, which should indicate that this crop can be produced profitably. It is known that the long warm midsummer days of this latitude are particularly advantageous to the yields and quality of this project. The farmers generally concede that extensive wheat production must be abandoned and a more diversified farm practice adopted, with livestock as a major pursuit. While sugar beets are not popular at the present, no doubt the advantages of this crop in connection with livestock feeding and soil tillage will soon be evident and it will occupy an important place in the farm program. It is believed that every possible effort should be exerted to encourage the rapid development of this industry. Considering this project with others of a similar character in the Northwest where general conditions are comparable, it is not unreasonable to assume that with the necessary improvement in cultural methods and irrigation practice the gross acre income from the project lands with the present ample water and under agricultural conditions as they can now be foreseen should be increased to at least \$25 per acre within the next 10 years.

#### FINANCIAL CONDITION OF RESIDENT FARMERS

*Capability of settlers.*—The greater portion of the original settlers were of Norwegian descent, and those remaining generally appear to be thrifty and industrious. They, as a rule, were not experienced in irrigation farming and did not readily adapt themselves to irrigation practice. There is still the general tendency to depend too much upon rain and not prepare for irrigation or apply water until crop damage has occurred. Until this tendency has been overcome and better use made of the irrigation system, maximum returns can not be expected from the project lands. There are, of course, many exceptions to this general rule, as a number of the later settlers were experienced irrigation farmers and now make a proper and advantageous use of water, and there is no doubt at the present time a more general tendency toward the use of project works. The type of agriculture practiced during the past has not been conducive of any great improvement to the land on the project. Large-scale wheat farming has been the popular pursuit; crops generally are planted in the cheapest suitable manner, with as little labor as possible expended upon

leveling or preparation for irrigation. No doubt as agriculture changes and the lands become more intensively farmed, cultural methods will improve and greater yields result.

*Cost of farm.*—Of 15 farmers interviewed during the survey, 9 have acquired farms by purchase. The prices ranged from \$10 to \$44 per acre, depending upon improvements, with an average of \$26 per acre. Down payments varied from nothing to full payment, the average being one-fourth down and seven years on the balance, with interest rates varying from 6 to 10 per cent. In some cases very good records of payment have been made, excellent farm homes have been developed, and the owners are contented and apparently fairly prosperous.

A few cases of recent purchases might be cited:

No. 1. Purchased 1925; area, 160 acres; purchase price, \$4,800, no down payment; 10-year contract; interest rate, 6 per cent. Purchaser has paid interest, but nothing on principal. Has improved the farm to some extent and acquired a dairy herd, which will no doubt make future payments possible.

No. 2. Purchased 1927; area, 160 acres; purchase price, \$2,800 (no improvements except fence); \$300 down, balance one-half crop; interest, 6 per cent. Gross revenue, 1928, \$3,700 from this farm.

No. 3. Purchased 1916; area, 160 acres; purchase price, \$6,000; \$500 down, balance one-half crop; no interest. Paid out in seven years, in addition to improving the place.

*Mortgage indebtedness.*—An analysis of mortgage indebtedness is shown by the following tabulation:

TABLE IV.—*Mortgage indebtedness*

Mortgagers	Number of mortgages held	Amount	Area encumbered
1 real-estate broker.....	24	\$36,528	3,440
Loan companies.....	12	22,173	2,041
Federal land bank.....	1	2,000	120
Other banks.....	34	66,146	4,808
Individuals.....	37	82,400	4,960
Total.....	108	209,247	15,459
Other mortgages.....	36	15,885	.....
	144	225,132	15,459

The above mortgages bear interest as follows: One, 4 per cent; one, 5½ per cent; fourteen, 6 per cent; eight, 7 per cent; eleven, 8 per cent; six, 9 per cent; sixty-one, 10 per cent; five, 12 per cent; or an average of approximately 9 per cent, or an annual interest burden of approximately \$20,000. These mortgages represent an indebtedness of \$14.60 per acre upon the lands encumbered, or \$5.40 per acre over the entire irrigable area.

Chattel mortgages in the amount of \$45,469 are held by local banks. Time did not permit an analysis of other chattel mortgages or notes, but on the basis of reliable information it is doubtful if this item exceeds \$2 per acre for the entire project.

As the greater portion of the land is unpatented, taxes have been confined principally to personal property and improvements; delinquencies, therefore, are relatively small, amounting to only \$5,500.

Individual indebtedness may therefore be summarized as follows:

First mortgages.....	\$209,000
Second mortgages.....	16,000
Chattel mortgages.....	84,000
Tax delinquencies.....	5,500
Total.....	<sup>1</sup> \$314,500

<sup>1</sup> \$7.50 per irrigable acre.

## IMPROVEMENTS AND EQUIPMENT

**Improvement.**—The farms of the project as a rule are fairly well improved. Farm buildings are substantial, generally, but not elaborate; barns and other outbuildings in most cases seem adequate; and of the several farmers interviewed, very few expressed themselves as requiring a great deal in the way of additional improvements. The lack of trees and shrubbery, however, was very noticeable, very few farms being supplied with shade trees or shelter belts.

**Equipment.**—Most farmers are well equipped to carry on their operations, and the equipment generally seems to be maintained in fair condition.

Equipment consists principally of tillage, hay and grain machinery, including 70 tractors and 20 trucks.

The following table of improvement and equipment valuation is compiled from the 1928 crop census and data assembled from interviews with 15 representative farmers during the present survey:

TABLE V.—Summary of improvements and equipment

	Project as a whole			15 typical farms		
	Improve- ment	Equip- ment	Total	Improve- ment	Equip- ment	Total
Total valuation.....	\$361,895.00	\$191,355.00	\$553,250.00	\$47,200.00	\$28,560.00 45,150.00 5.70 9.03	\$75,760.00 92,350.00 15.19 18.43
Per acre operated 1928....	11.90	6.25	18.15	9.40	1,140.00 1,800.00 1,900.00 3,000.00	5.70 9.03 3,030.00 3,690.00 5,040.00 6,140.00
Per farm operated.....	1,015.00	540.00	1,555.00	1,890.00		
Per farmer.....	1,985.00	1,050.00	3,035.00	3,140.00		

In an analysis of the above table consideration must be given to the fact that about 180 farmers were operating 355 farms, and that with full development and utilization of the area involved a considerable increase over the units as shown in the portion of the table covering the project as a whole must necessarily be expected. The 15 typical farmers cultivate an area of about 5,000 acres, comprised within 25 farms, and are representative of conditions generally over the project. In a few of these cases they are excellent, while in other cases the improvements are inadequate. It is very doubtful if improvements sufficient for a 160-acre stock farm can be constructed for less than \$3,500, exclusive of land improvements.

The equipment of the 15 typical farmers includes an investment of \$16,590 in 10 tractors and 3 threshing machines; the tabulation, therefore, is divided into two parts, the upper amounts excluding these items and the lower including all machinery. Under present conditions and with the type of agriculture practiced in northern Montana a tractor and appropriate tillage machinery is considered a necessity, and while it may not be required by a new settler, inadequately financed, as initial equipment, still it is almost certain to come before many years of operation. While in many cases the valuation of improvements and equipment are estimates, yet it is very doubtful if the investment in these items, spread over a period of not more than five years, would be less than \$4,000 for the average settler upon a 160-acre farm if adequately improved and equipped.

**Livestock.**—It is the general feeling among the project farmers that through stock raising principally can farming be made profitable. Whether this will run to sheep or cattle depends upon the inclination of the farmer; either will greatly increase the farm revenue if properly handled. As the project is particularly adapted to the production of forage and feed crops, and since there is now the necessity for reforestation and clearing up of a great portion of the land after continued wheat production, stock raising is considered an essential factor in the success of the project. Of the 15 farmers interviewed 9 either major in stock at the present time or are building up the livestock to the maximum which can be successfully handled as rapidly as finances permit. In each of these cases the farm revenue during the past year was principally from

stock rather than from the direct sale of produce. Many wheat farmers could not show a net revenue and several admitted a loss. This tendency toward livestock will, no doubt, stimulate sugar-beet production when the value of the by-products in feeding operations is realized and they can be made available for consumption. At present there is little finishing of the animals for market practiced upon the project. With the abundance of feed available and satisfactory marketing facilities it is believed that this can be made a profitable practice. The lack of available open range seems to be somewhat of a handicap to the more rapid promotion of the livestock industries. There is, however, a noticeable lack of good irrigated pasture upon the project. Alfalfa or sweetclover pastures, particularly the latter, are not entirely satisfactory on account of the bloat hazard. The more general establishment of irrigated pastures with grasses which have been proven satisfactory to this locality, such as the "Huntly mixture," will overcome to a great extent these difficulties and allow the year-round carrying of a profitable dairy herd or farm flock fed entirely upon the produce from the farm.

There is a very good field for farmers so inclined in the production of hogs upon the project. A packing plant is located in Great Falls which creates practically a local demand for pork. Hogs can be transported to market in a very few hours, thus placing a high-quality product at the plant with a minimum loss to the farmer through shrinkage. It is stated, however, by officials of the plant that the supply, particularly of heavy hogs, at present exceeds the demand, due to the market limitation imposed through Federal inspection. However, the products of this plant are recognized throughout the State as high quality, and the market will no doubt be rapidly extended. Much of the plant's supply is now shipped in from adjacent States, as it is evident that better animals can be secured. There is a demand for killers of from 185 to 200 pounds, which at present is not supplied by local hog raisers. One farmer of the project has gone into hog production extensively with very satisfactory results, and no doubt others could be as successful.

The general trend in livestock during the past five years is shown by the following tabulation:

TABLE VI—*Livestock census*

	1928	1927	1926	1925	1924
Draft animals.....	900	1,055	1,126	1,213	1,379
Beef cattle.....	1,282	1,157	1,274	1,353	1,493
Dairy cattle.....	647	729	738	1,006	918
Sheep.....	11,786	7,920	8,624	7,196	4,163
Hogs.....	1,679	1,193	909	1,027	1,065
Poultry.....	12,241	11,727	10,089	11,814	13,208
Total value.....	\$315,044	\$232,256	\$230,770	\$252,637	\$197,124

While the above tabulation is not favorable to dairying or the production of beef stock, the increase in sheep is noticeable. There is a general tendency in favor of this branch of the industry at present, and with only one or two exceptions the farmers interviewed, who are stockmen, expressed a decided inclination toward sheep.

*Farm credit required.*—Statements of the 15 farmers who have improved farms and established homes upon the project vary considerably as to the amount of credit required to properly improve and equip a farm. Several state that this can be accomplished by the industrious settler with little financial aid aside from that of local banks through short-time loans. The average of 14 statements as to the amount of credit necessary was \$3,200, but that such loans would be feasible only on long maturity notes with interest rates not to exceed 6 per cent. This matter was given careful consideration in every case, and the answers are believed to be conservative and based upon the knowledge and experience in local conditions.

*Size of farms.*—It is almost the unanimous opinion of the farmers that the size of the farm should not be limited to less than 160 acres, and several recommend the 320-acre unit. In view of the fact that the agricultural program of the project must be based principally upon livestock, with the requirement for a considerable area in pasture, no doubt the 160-acre maximum unit is best adapted to conditions as they exist at the present time. As the project develops and the production of sugar beets or other cultivated crops

becomes the more general practice there may be a tendency toward smaller farms. Yet with the type of agriculture which must be anticipated for some years to come, and in view of the low-water costs, the recommendation of less than the 160-acre maximum unit is not believed to be justified.

#### SETTLEMENT

*Land prices.*—Recent land sales have been few, but those of record show the present prices to vary from \$20 to \$50 per acre, depending upon improvements. Terms and interest rates are variable, but upon the basis of reliable information it is believed that satisfactory terms of purchase will be given to substantial settlers by those who have property for sale.

*Cooperation in settlement.*—There is no great demand for project land at the present time, nor is there any great tendency by local interests to push colonization. There is room at present for at least 200 families upon the project in order to make a complete utilization of its resources. Except in a few individual cases there has been little assistance from local capital in the preparation of the idle or partially developed farms for occupancy. Many farms are not supplied with buildings, and under present conditions and with the capital required to adequately improve and equip a farm it is difficult to secure new settlers for such farms. Some means should be provided to make possible the partial improvement of these farms, providing at least adequate shelter for family and livestock if they are to be made attractive to settlers. One example of the kind of cooperation needed is that of a landowner who has placed a new settler upon a 320-acre farm as a lessee with an option to buy on a crop-share basis. The landowner erected an excellent house and furnished material for other outbuildings with the lessee doing the work. By making this additional investment in the property it was possible to obtain a first-class experienced farmer with some capital as a new settler, who has during the past two years accomplished much in the improvement of the farm. More assistance of this nature is needed.

*Cooperation by railroads.*—Representatives of both the Chicago, Milwaukee & St. Paul and the Great Northern Railroads, which are active in colonization, have indicated that these companies are ready and willing to cooperate in any way possible toward furthering a settlement program which has the approval of the Bureau of Reclamation and the irrigation district board. The Great Northern Railway maintains a very active and efficient settlement organization, which has accomplished a great deal in the colonization of the irrigated projects of northern Montana during the past three years. Milwaukee officials have expressed a great interest in the colonization of this project and recently have made a thorough study of its possibilities, and will without doubt actively assist in securing new settlers.

#### DEVELOPMENT COSTS

From an analysis of the above data, development costs from the raw land to a farm of maximum productivity may be summarized as follows:

Land cost.....	\$4, 000
Leveling and ditching.....	1, 600
Buildings and improvements.....	3, 000
Equipment.....	1, 000
Stock.....	800
Total.....	10, 400

It is not to be expected that this amount would necessarily be available at the time of settlement, as some of the items would be spread over a period of several years. A down payment on land of more than 10 per cent should not be expected, and the balance should be extended over at least 12 years, with no payments except interest during the second and third year. Leveling and ditching can be accomplished cheaply, as clearing is practically a negligible item and the land generally is easily prepared for irrigation. This work can be accomplished by the farmer with little capital investment. Improvements during the first two or three years should not exceed \$2,000. Five sets of very substantial buildings, consisting of a home and barn, have been built by a company financing improvements upon the Milk River project during the past

year for \$1,600. The equipment estimate is low if a tractor is to be purchased; however, the amount will no doubt cover the necessary requirement for the first few years. The \$800 for stock will provide only a start, but additional finance in this industry is not difficult to arrange, provided the farmer is industrious and has available feed.

An analysis of probable costs and returns from operations is not possible herein, but by a careful study of much reliable material prepared upon this feature an estimated net revenue of \$2,000 per year from a 160-acre farm with livestock is not believed unreasonable to assume, exclusive of interest, taxes, and water payments.

#### CREDIT AVAILABLE

It is very evident that the development of a farm upon the project to the maximum state of productivity by the type of settlers now available will require some source of credit. While the Federal land banks would no doubt make loans upon improved farms, they can not do so upon unimproved or partially improved lands. Neither can loans be made by this institution upon unpatented lands, as the title still rests with the United States. While the farmers as a rule express a high regard for the local banking institutions, these are not able to go deeply into long-time loans with low-interest rates, but must confine themselves to the more liquid short-maturity transactions. One source of credit which has not been utilized by project farmers is that supplied by the Agricultural Credit Corporation of Minneapolis in connection with livestock finance. This corporation has done much in promoting the livestock industry in Montana, especially among farmers upon other irrigation projects. Livestock loans are made to reliable farmers on very reasonable terms, and it is believed that many who are now having difficulty in financing a livestock program could make use of this corporation to advantage.

The owners of lands for sale, while no doubt willing to sell at reasonable prices and long-time payments, do not desire to invest more capital in the holdings or to assist financially to any great extent in the development of the farms. If the project is to develop rapidly under present agricultural conditions, some method must be provided for the financial assistance of worthy settlers, either by local, State, or Federal cooperation. Development funds of such a nature have been provided upon other privately financed irrigation projects of the State, and the present evidence is that they are operating in a satisfactory manner, and there is no doubt but that the economic success of this project would be greatly enhanced through such a fund.

#### MARKETS AND TRANSPORTATION

The project is served by branch lines of the Chicago Milwaukee & St. Paul and the Great Northern systems, with the principal markets Great Falls, Seattle, Minneapolis, St. Paul, and Chicago. A sugar factory is located at Chinook, about 190 miles from the project, which at the present time can care for this product. The industry should, however, be developed within the course of the next few years to a point justifying the location of a factory closer to the project which would serve this and other irrigated areas in its immediate vicinity. A favorable freight rate is now provided by the Great Northern Railway from the project to the Chinook factory. Such a rate has not yet been definitely established by the Chicago Milwaukee & St. Paul Railway, which serves the greater portion of the project. It is understood, however, that this rate has been approved and will be published in revised tariff schedules very shortly. This should be done in order to encourage the production of beets. At the present time transportation conditions are adequate for the needs of the project, although storage and loading facilities might be somewhat improved at the principal shipping points, especially for stock shipping. There is no doubt, however, but that the railroad companies will make the needed improvements when project development warrants the additional investment.

#### FINANCIAL OBLIGATIONS OF THE DISTRICT

*Bonded indebtedness.*—The district has no outstanding bonded indebtedness.

*Contracted obligations.*—The ultimate contractual obligation with the Government is \$9,500,000, applicable to 93,031 acres, or approximately \$102 per acre. Repayment is to be made on a crop-production basis. The average acre income



for the past 10 years has been \$16, which will require a payment of 80 cents per acre. Assuming that within the next 10 years revenue should increase under improved conditions to \$25 per acre, payments would then be \$1.25 per acre per annum.

**Operation and maintenance.**—Operation and maintenance costs do not exceed \$25,000 per year at present or 60 cents per acre. Levies for operation and maintenance purposes have not yet been made by the irrigation district, and it is estimated that the first levy will not be less than 85 cents per acre to provide a surplus and start a revolving fund for tax-title purchase. The project is excellently constructed; and while operation costs may increase somewhat with full development, there should be little increase in maintenance costs for some time. Operation and maintenance should not exceed \$1 per acre per annum, inclusive of district administration costs and the maintenance of a revolving fund for tax-title purchase, for some years to come.

**County taxes.**—At the present time county taxes are low, the lands being assessed at the rate of from \$10 to \$16 per acre in Teton County and from \$16 to \$40 per acre in Cascade County, the valuation for taxation purposes being one-third of the actual valuation. Levies vary from 20 to 32 and from 40 to 80 cents per acre in the respective counties. The lands in Cascade County comprise only a very small portion of the project, and the average acre levy at the present time does not exceed 40 cents. This will no doubt increase somewhat as the project develops.

Taxes, both present and anticipated future, may therefore be summarized as follows:

	Present	Future
Construction repayments.....	\$0.80	\$1.25
Operation and maintenance.....	.85	1.00
State and county.....	.40	.60
Total per acre.....	2.05	2.85
For 160-acre farm.....	328.00	472.00

#### PROJECT NEEDS

As a whole, conditions are favorable to a rapid and healthy development of the project. Many farmers are contented and fairly prosperous, which is a very helpful factor in obtaining new settlers. There are practically no large holdings which require subdivision, although a few 320-acre farms might support two families as well as one at the present time. There is perhaps a tendency toward too large-scale operations instead of intensive cultivation of smaller units. Wheat farming as a major pursuit should be abandoned and diversified farming with livestock be the more general practice. More care should be given to proper irrigation at the time when needed and less attention given to rain clouds during the growing season. Sugar-beet growing should be encouraged, but care should be exercised that the lands are fitted and adapted to the crop before production is attempted. Some definite program should be formulated for the advertisement and disposal of the idle or partially tilled lands of the project, which involves a definite fixed price for the lands through options for sale providing long terms of payment at reasonable interest rates. The irrigation district board appreciated the need of action such as this and has expressed itself as willing and anxious to further any conservative program which will point toward project development. The basis of this program should be the same as that used upon other projects which have privately owned lands for sale. Every possible effort should be exerted by individual farmers to control the spread of Canadian thistles and other noxious weeds which are becoming prevalent upon some localities of the project. The planting of more trees and shrubbery should be encouraged.

Apparently all conditions are favorable for the development of the project and should the necessary settlement be obtained, it is not believed that any apprehension need be felt over the ability of the district to fulfill its contractual obligation with the Government fully and completely.

## LOWER YELLOWSTONE PROJECT, MONTANA-NORTH DAKOTA

(By George O. Sanford, Superintendent Sun River Project, Montana)

## 1. INTRODUCTION

An inspection of the lower Yellowstone project was made July 10 to 16, inclusive. With the assistance of the project superintendent a number of water users were interviewed as well as bankers, business men, and the manager of the sugar factory at Sidney. On the afternoon and evening of July 10 a meeting of the joint irrigation district board was held at Sidney.

From my inspection of the project, which I have not visited for 14 years, I can report that good progress has been made along the lines of sound agricultural practice, and that if some few difficulties can be overcome the project will be over the hump and moving along the down grade. A trip over the project shows conclusively that it is on the road to success. The results have justified its construction. The farmers will never be troubled with a shortage of water. Of the Montana projects, it possesses the advantage of being nearest eastern markets, where practically all livestock must be sold, and all of the northern projects must depend chiefly on livestock production for their principal revenue. Sugar beets are a success and beans are just becoming an important cash crop. Fundamentally the project is sound; the existing defects are temporary and can be cured. The important matters that require attention are:

(a) More settlers are needed. There is now a lack of man power to operate the farms under the ditch the way they should be operated.

(b) There is a lack of suitable buildings on nearly all vacant farms, and because of this it is very difficult to secure new settlers.

(c) At the present time about 80 per cent of the landowners are carrying the burden of operation and maintenance and the payment of construction charges. Consideration must be given to getting all of the land into production, so that each acre will carry its share of the district charges.

(d) There is no provision for furnishing credit during the development period of the farm, and not very much in the way of long-time loans on improved farms.

(e) State and county taxes are based on an excessive valuation of irrigated lands. These should be readjusted, especially while the project is going through the development period.

(f) The method of determining value of crops should be considered, particularly the sugar-beet crop, where the cost of hand labor is included in the gross value of this crop.

These various problems will be considered in this report with a view to reaching some satisfactory solution.

## 2. MEETING WITH JOINT IRRIGATION DISTRICT BOARD

On Wednesday afternoon a meeting was held with the commissioners from irrigation district No. 1 in Montana and the commissioners from irrigation district No. 2 in North Dakota. The project superintendent was present. At this meeting the purpose and extent of the investigation was outlined and the individual members of the board given an opportunity to express their opinion as to what they thought should be changed and how it could be accomplished. Some of the commissioners thought that the full construction installment had been reached a little too soon, and that while the record showed that district No. 1 had met all payments promptly, it was the opinion that there were some individuals who had paid their charges with borrowed money and not what they had made off the farm. It was pointed out that the principal object of the investigation was to help speed up development, so that the charges prescribed in the district contracts could be paid and sufficient money left to pay living and operating expenses and a reasonable sum left for farm development.

The impression was gained that some board members were a little too willing to let Uncle Sam assume responsibilities that could and should be taken care of to far better advantage by the board. The water users are in the game, and they must be ready and willing to do all they can to speed things along the road to prosperity. If they will borrow a little enthusiasm from some of the water users I met, who are satisfied with present conditions and have faith in the future, it will be a move in the right direction. The district boards are traveling a new trail, and they are naturally proceeding with caution, as they

have some doubt as to being able to live up to the provisions of the contract. The big obstacle confronting them is to get all the lands paying charges. If this can be accomplished, things will be in pretty good shape. The meeting with the board was very helpful in learning the general situation on the project and getting a definite idea as to the important matters that should be investigated. There was a good cooperative spirit shown between the board and the project superintendent, which promises well for the future success of the project.

### 3. INTERVIEWS WITH WATER USERS

The major portion of the time on the project was spent in interviewing individual water users. In most cases it was necessary to make more than one call. In some instances the man was working in the field with a haying crew and could not spare the time to give full answers to the long questionnaire. In all cases an endeavor was made to find out from the individual what he thought was wrong with the project and what should be done to correct it. The majority of the water users interviewed were quite optimistic and felt they were making progress each year. It is realized that the individual's knowledge of conditions on the project is usually limited to his own farm, and that he is not in as good a position to pass on conditions as the board members, who know what percentage of the water users are paying.

### 4. LOCATION, AREA, AND WATER SUPPLY

The lower Yellowstone project is located in eastern Montana and comprises an irrigable area of 59,349 acres, a small part of which lies in Dawson County, Mont., a little less than two-thirds in Richland County, Mont., and about one-third in McKenzie County, N. Dak.

Water is taken direct from the Yellowstone River, and the flow of the river is always in excess of the requirements on the project.

### 5. CANAL SYSTEM

The main canal is 71.6 miles long, and there are approximately 200 miles of laterals. The main canal in places is constructed along a steep hillside, where some trouble has been experienced with sliding ground, particularly during the early period of operation, which began in 1909. The water diverted from the Yellowstone River carries a considerable quantity of silt, so that the project will always be confronted with considerable expense in cleaning canals. The system is well constructed and is being operated in a satisfactory and successful manner.

### 6. DRAINAGE

During recent years there has been an area of 7,500 acres of land affected by seepage, which became quite a serious problem in connection with the development and settlement of the project. About 6 miles of drains were constructed in 1913-14, but nothing more was done until after the execution of the contract with the irrigation districts in the fall of 1926, which contract provides for an expenditure on the part of the United States of \$342,000 for the construction of drainage works. Good progress is now being made, and at the end of June, 1929, 54 miles had been completed and the program calls for an additional 41 miles, which it is expected will put all of the seeped and threatened areas in safe condition.

### 7. CLASSIFICATION OF LAND

The farms on the lower Yellowstone project were classified by a local board consisting of two water users and the project superintendent. The lands were divided into the following classes:

Class 1.....	12,900
Class 2.....	20,960
Class 3.....	11,390
Class 4.....	2,530
Subtotal.....	47,780
Class 5.....	10,910
Total.....	58,690

Class 5 comprises principally lands affected by seepage and river-bottom lands that are now covered with brush but which will eventually be cleared and made productive.

In determining whether lands should be placed in the paying or nonpaying classes the local board, when in doubt, placed the land in the paying class, as they were of the opinion that the larger the area that could be assessed, the lower the rate per acre for operation and maintenance. It is now found that about 1,000 acres of land was placed in the paying classes which more properly should have gone into class 5, and while assessments are levied against this land, the charges are not paid. It is understood that under existing laws and regulations the present classification can not be changed. If there is any possibility of giving further consideration to this relatively small area with a view to placing it in class 5 until it can be made productive it is recommended that this be done.

#### 8. STATUS OF OWNERSHIP

With the exception of a very small area of brush and timber land, there is no vacant public land on the lower Yellowstone project. The land has been homesteaded and in most cases patent has issued. The Northern Pacific Railway owned considerable land within the limits of the project, which they placed on the market at a very reasonable price and terms of payment.

The status of the irrigable area is:

	Acres
Public entered-----	13, 546
Withdrawn-----	2, 067
State unsold-----	986
Railroad unsold-----	95
Private-----	42, 655
Total-----	59, 349

#### 9. BRIEF HISTORY

The lower Yellowstone project was first investigated in 1903. Preliminary surveys were started the following year, and in 1905 contracts were executed for the construction of the canal system. Water was first delivered in 1909, and during the early years that the system was operated there was a heavy expense connected with maintenance and betterment work.

There was a general understanding among the settlers on the project that the construction cost would be \$30 per acre. The public notice of December 21, 1908, announced the charge at \$42.50. There was a strong element on the project that continued to hold the \$30 construction charge could not be exceeded, and this element used every means possible to make the Government reduce the construction charge to \$30, and at one time they very nearly succeeded in accomplishing this object. In view of the antagonistic sentiment that existed on the project, it was very difficult to go ahead with its development and have the landowners make use of the water that was available, and in 1925 conditions were such that the Secretary of the Interior gave serious consideration to selling the project.

During 1926 an adjustment of existing differences was reached and a contract entered into with the irrigation districts in Montana and North Dakota whereby they agreed to repay on the crop-value basis the expenditures incurred by the United States as determined by the adjustment act of May 25, 1926. Drainage works were to be constructed for the relief of land that was seeped or threatened with a high-water table. Since the execution of this contract the feeling on the project has greatly improved, and there is now every indication that the terms of the contract can be carried out and the successful development of the project continued.

#### 10. AGRICULTURAL DEVELOPMENT

During the early history of the project the agricultural development was very slow and unsatisfactory. There was a strong sentiment against irrigation, and whenever possible the farmers would rely upon rainfall rather than taking advantage of water that was available in the canal system. Beginning with 1917 some real progress was started, and that year the Great Western Sugar Co. took up sugar-beet culture on the project, and by 1924 had reached an area

sufficient to warrant the construction of a factory, but because of the fact that the factory at Billings, to which place the beets were shipped, had recently been enlarged and was able to take care of all beets from the lower Yellowstone project, this company did not erect a factory, and as a result of this decision the landowners and beet growers on the project signed up with the Holly Sugar Co., which resulted in the erection of a sugar factory at Sidney. This factory has been the chief factor in stimulating development on the project, and in addition to about 6,300 acres of beets that are being grown this year there will be in excess of 1,500 acres of beans, which is expected to return as much as the beet crop. There are a large number of sheep fed each fall and interest in dairy cattle and hogs is increasing.

In April, 1927, an agricultural conference was held at Sidney under the supervision of the Montana extension service in agriculture and home economics. The results of this conference are printed in Bulletin No. 89 of the Montana extension service, copy of which is attached to this report and which covers in considerable detail the development of the project at that time. Good progress has been maintained since this conference.

#### 11. CLIMATIC CONDITIONS, INSECT PESTS, ETC.

The lower Yellowstone project has an average frost-free period of approximately 130 days, which gives ample time for the production of all staple crops on an irrigated farm. Two cuttings of alfalfa can always be secured, and in some years a fair third cutting, or at least a good pasture crop, is grown. There are times during the summer when temperatures in excess of 100° are reached, but with an ample supply of water crops can always be kept in a good healthy condition. The winters are cold but not too severe to interfere with dairying and other livestock operations, although it is necessary to feed stock for at least one-half of the year, but this is a condition that must be faced on all Montana projects and arrangements made to meet it.

There are practically no mosquitoes on the project and no other insect pests.

#### 12. FORMATION OF IRRIGATION DISTRICTS

Irrigation districts were formed under the provisions of State law in Montana and North Dakota in 1920 and contracts executed that year covering the payment of construction costs and the extension of the lateral system to cover an additional area of 17,000 acres.

In order to receive the benefits of the adjustment act of May 25, 1926, new contracts were executed with the two districts, one on September 23 and the second on November 2, 1926. These joint-liability contracts provide that construction charges shall be based on 5 per cent of the average acre income; that the United States will construct drainage works costing not to exceed \$342,000; and that on December 31, 1931, the districts will assume the care and operation of the canal system.

#### 13. IRRIGATION DISTRICT ASSESSMENTS

The total irrigable area in the four paying classes is 47,780 acres. The annual construction installment is 5 per cent of the average acre income for the 10 years last past. In 1928 the district was required to pay 70 per cent of this amount. The total levy for each class of land was:

	Class 1	Class 2	Class 3	Class 4
Construction.....	\$1.55	\$1.05	\$0.85	\$0.55
Operation and maintenance.....	1.10	1.10	1.10	1.10
Revolving fund.....	.10	.10	.10	.10
Deficiency.....	(1)	(1)	(1)	(1)
District.....	.10	.10	.10	.10
	2.85	2.35	2.15	1.85

<sup>1</sup> Included in construction.

The total levy for the entire project was \$115,170. On June 1, 1929 the unpaid assessments were:

District No. 1 (Montana)-----	\$15, 633. 48
District No. 2 (North Dakota)-----	10, 395. 95
Total-----	26, 029. 43

Interest and penalties are not included. The above figures show that 22.6 per cent of the total levy is still unpaid.

The delinquent payments for 1926 are:

District No. 1-----	\$6, 302. 50
District No. 2-----	4, 540. 74
Total-----	10, 843. 24

The following figures on State and county taxes in North Dakota may be of interest:

1927—Total, \$10,729.28; delinquent \$1,920.73, or 18 per cent.

1928—Total, \$12,564.54; delinquent, \$2,672.85, or 21 per cent.

It is reasonable to assume that delinquencies would run about the same in Montana.

The levy for 1929 is:

	Class 1	Class 2	Class 3	Class 4
Construction-----	\$2. 10	\$1. 60	\$1. 05	\$0. 55
Operation and maintenance-----	1. 10	1. 10	1. 10	1. 10
Revolving fund-----	. 10	. 10	. 10	. 10
Deficiency-----	. 10	. 10	. 10	. 10
District-----	. 10	. 10	. 10	. 10
	3. 50	2. 90	2. 45	1. 95

#### 14. DELINQUENCIES

The previous paragraph brings out the fact that approximately 22 per cent of the 1928 district levy is still unpaid. For the most part these delinquent assessments apply on lands owned by nonresidents, although there are a number of cases where resident owners have not been able to meet the charges and in such cases various reasons are the cause of this delinquency. In one case the farmer owned too much land which was covered by a heavy mortgage and he was trying to farm too large an area. Although he was anxious to sell a part of his land, he was hopeful he could secure a price that would pay off his indebtedness, all of which seems to be an impossibility. Another case came up where a farmer had lost four consecutive crops and is facing a loss of the 1929 crop. A heavy hail and rain storm early in June damaged the sugar beets and left him in shape so that he could not get the necessary money to pay the district charges so that water could be delivered.

In looking over the delinquent-tax record cases were found where State and county taxes had not been paid for the past seven and eight years. While the law compels the county commissioners to take action in the sale of such lands this has seldom been done. The law passed at the last session of the State legislature relieves the situation so that it seems probable most of the delinquent farms can be placed in the hands of some one who will get them in productive condition. The following plan is now followed: Upon request of the irrigation district commissioners the county commissioners make application to the district judge to have the land appraised and offered for sale at public auction, with the proviso that it must be sold at not less than 90 per cent of its appraised value. The district board stands ready to purchase the land at this price. Upon securing tax certificate, it then proceeds to dispose of the land at a price sufficient to take care of the delinquent district charges. The delinquent State and county taxes are written off. Under the terms of the contract the district has three years in which to hold this land without payment of charges. It is understood in most cases the district board has already a prospective purchaser in view. These lands are being offered by the board

with an initial payment of one-fifth of the purchase price, with the balance in four annual installments at 6 per cent. In case some portion of the land can not promptly be brought into productive condition the district board can make an adjustment in the levying of assessments for the 3-year period after acquiring title to the land as provided in article 48 of the Montana contract.

The board is now proceeding somewhat slowly in taking over delinquent lands because the revolving fund has not been large enough to go into the proposition on a more extensive scale and there has not been much of a demand for unimproved farms under the ditch. Without doubt the extremely dry year of 1929 will result in an increased demand for these farms, especially from dry-land farmers living near the project. It is my opinion that the board should take up this matter of the purchase and sale of delinquent land in a more aggressive manner.

#### 15. MORTGAGE INDEBTEDNESS

With the assistance of the local abstract man at Sidney, figures were secured on the mortgage indebtedness in Richland County. He reports 136 loans, totaling \$391,000, divided as follows:

	Per cent
37 loans at-----	10
25 loans at-----	8
23 loans at-----	6

and the balance ranging from 5 to 9 per cent with an average rate of 7 per cent. The chattel-mortgage loans in effect in Richland County approximate \$350,000, all bearing interest at 10 per cent.

An effort was made to secure similar data on loans in McKenzie County, but upon examining the county records it was found that it would require several days to compile the desired information, and when it had been so compiled there would be considerable doubt as to its accuracy, and for this reason no figures were obtained as to the loans on that portion of the project lying in North Dakota. About the best estimate that can be made is that loans on this portion of the project would run about the same per acre as in Montana, where two-thirds of the project is located, and one-third in North Dakota. This being the case, the real-estate loans would be about \$195,000 and the chattel-mortgage loans \$175,000. The above statement shows that the farmers on the project are carrying a heavy mortgage load, as the annual interest payment on both real-estate and chattel mortgages would be about \$80,000, all of which goes to show that there is a real need for providing credit to the farmers at much lower rates of interest.

It is probable that these figures are somewhat in excess of the actual indebtedness for the reason that whenever partial payments have been made there is usually nothing to show on the records until the loan has been paid in full and the release filed.

#### 16. STATE AND COUNTY TAXES

In connection with State and county taxes to be levied on the Fort Shaw division of Sun River project, information on land values was secured from the four Federal reclamation projects in Montana. The following values were given to irrigable lands on these projects:

##### Fort Shaw division:

Class 1-----	\$50.00
Class 2-----	45.00
Class 3-----	40.00
Class 4-----	35.00

##### Greenfields division: \$14 and \$16.

##### Milk River project:

Class 1-----	50.00
Class 2-----	40.00
Class 3-----	25.00
Class 4-----	17.50
Class 5-----	10.00

##### Huntley project: \$30 to \$65.

Class 5-----	16.00
--------------	-------



*Lower Yellowstone, Richland County, Mont.*

Distance from elevator	Class 1	Class 2	Class 3
1 mile.....	\$72.90	\$56.60	\$40.50
2 miles.....	70.50	55.00	39.70
3 miles.....	68.00	53.40	38.80
4 miles.....	65.00	51.80	38.00
5 miles.....	63.10	50.30	37.20

From the above it is seen that irrigable lands in Richland County have the highest assessed values of the Federal projects. The county officials are nearly all from the dry-land portion of the county. It is frequently stated that the commissioners consider the irrigated portion a liability rather than an asset. From what I was able to learn about the situation, it was next to impossible to have the matter given consideration, as the county officials, beginning with the county assessor, has been very successful in "passing the buck." The tax situation on all projects consists in raising sufficient revenue to pay county expenses. The two big items of expense are schools and roads. If values are lowered, then levies must be increased. The case to be considered is an equitable adjustment between the dry land and the irrigated lands. From my knowledge of conditions on other projects, it would seem that land values on the Lower Yellowstone project in Richland County are too high. This is a matter for the consideration of the irrigation district board and the landowners. Thus far there has been no concerted action, and most certainly values will not be lowered if there is no protest.

A committee of landowners met with the county commissioners of McKenzie County about July 19 to consider land values in North Dakota. No information was received as to action taken, but it is understood that some reduction was assured.

## 17. SETTLEMENT PROBLEMS

As pointed out in the introduction paragraph, one of the problems on this project is securing more settlers. There is no land now open to homestead entry. Private lands can be purchased. A concerted effort has been made to secure new settlers, and while the results have not been all that could be hoped for, something has been accomplished. One of the provisions in the irrigation-district contracts of 1926 was that 8,000 acres be placed under option of sale by the Bureau of Reclamation upon terms and prices satisfactory to the Secretary. Options were secured on 77 farms. The Great Northern, Northern Pacific, and Holly Sugar Corporation took an active interest in the work. The methods followed are fully described, beginning on page 159 of the proceedings of the Denver conference, March 13-15, 1929. The results to date are 20 farms sold, mostly to local people.

In discussing settlement with the settlement agent who is employed by the railway companies the statement was made by him that he could attract good farmers from Colorado, but unless he could lead a man to a farm with a good house he could not make a sale, and there are practically no farms on the project that were for sale where the improvements, in case there were any, were fit for human habitation. An effort has been made during recent years to interest Congress in providing funds to be loaned to erect improvements on idle lands, but thus far without success. There is a real and vital need for credit of this sort, and it would result in speeding up the revolution of the reclamation fund. In considering this need on Federal projects the thought occurred of private capital being provided along the lines of the Agricultural Credit Corporation. It is understood that only a portion of the money made available for this very beneficial work of livestock loans has been used and the annual repayments and loans are each now about \$2,000,000.

The district board has begun to acquire tax title to delinquent land, and within the next few years there will be a considerable number of such tracts offered for sale at very low prices. The sale of these lands will result in a general lowering of the price of lands that are now being offered for sale. The district board must take hold of this matter in an aggressive manner. They are in the best position and best qualified to carry this out in a successful manner. The Bureau of Reclamation should not be given authority to acquire

title to such lands. Their direct responsibility should cease with the construction of the canal and drainage systems. The extreme dry season of 1929 is going to stimulate interest in irrigation and undoubtedly there will be a number of dry-land farmers looking for a chance to make a start under irrigation. Such a man would usually have the necessary livestock and farm equipment, but the difficulty to be overcome is to find ways and means to erect the buildings and get the land in production. The railroad settlement agent also reported that in no case had any of the prospective settlers encountered any water users who knocked the project, which is a very good index of conditions. One of the best means of inducing new settlers to come to a project is the favorable reports sent out by men already on the ground. If they are doing well it makes it very much easier to get a new man to take up land. The Holly Sugar Co. has been a very helpful factor in settlement work and the manager stated that in the case of any land acquired by the district that was suited to beet production they stood ready to take that land and would place a beet grower on it.

#### 18. LOANS BY FEDERAL LAND BANK

The Federal Land Bank of Spokane has made 19 loans on the Montana portion of the project, the average loan per acre on 1951 acres being \$26.60. Three loans have been foreclosed, one of which has been sold, and there is one loan that is delinquent two installments with three years delinquent taxes. With the exception of one loan made in 1927 the loans were closed from 1921 to 1923. It appears from the above statement that the Federal Land Bank is doing some business on the lower Yellowstone project.

No loans have been made in North Dakota, which area comes under the bank at St. Paul. On July 16 Mr. Roy Dory, of Williston, N. Dak., local representative of the bank, met with the project superintendent and Mr. Sanford. The question of making loans on irrigated land was discussed and it was found there was a lack of knowledge and possibly a lack of interest in irrigation development. It was understood that one official of the bank had visited the project in recent years and definitely recommended against loans on irrigated lands. No local association has ever been formed in North Dakota and there is a question as to whether the landowners are sufficiently interested to form such an association. There is an association of dry-land farmers on the east side of the Yellowstone, but it would not be advisable to expand this association to cover the irrigated farms. While there was not time to get down to details in the matter of Federal farm loans there can be no question but what the security for such loans is equally good in North Dakota as in Montana. The first question to be answered is: Are the water users sufficiently interested to form a local association? The answer to this would naturally be based on whether or not the bank would make loans if it were found the security was ample and the prospect good for the return of the loan. If the North Dakota portion of the project has not been recently examined this should be done so that some general idea could be given as to the basis on which such loans could be made. With this information the landowners could consider the question of forming an association.

My suggestion is that the Federal land bank be requested to give further consideration to the question of making loans in North Dakota, and if they do not have on hand sufficient data to determine whether or not, it will be possible to make such loans then a competent engineer-appraiser visit the project, confer with the project superintendent, and, if the prospect appears favorable, call a meeting of the water users to consider the question of forming a local association.

#### 19. REVISION OF VALUE OF BEET CROP

19. The contracts with the water users on the lower Yellowstone project provide that the construction charge shall be computed on 5 per cent of the average gross acre income for the 10 year's last past. Based on the 1928 crop report the average acre charge would be \$1.26. The beet crop comprises 58 per cent of the total value of crops and figures \$57.95 per acre. This crop is an important factor in determining the annual construction charge. The district board feel that the value given to the beet crop is not just and places a heavy burden on the productive lands for the reason that the beet grower is required to pay the sum of \$25 per acre for hand labor. Leaving the hand labor out of the discussion the

work required in producing and harvesting a crop of beets is greater than any other crop grown on the project. In addition to this, the grower is obliged to reduce his acre income by the sum of \$25 and he holds that he should not be assessed on this amount.

In discussing the sugar-beet situation on the project with the manager of the local sugar company the statement was made by him that by leaving the cost of hand labor in the gross value of the beet crop it had an adverse influence in attempting to increase the area of beets. While it seems to me that this shows a decidedly narrow point of view on the part of the prospective beet grower the statement will be accepted as given. If the 1928 crop census were figured by deducting \$25 per acre on beets, the average value per acre would be reduced from \$25.27 to \$18.95, or an average reduction of 31 cents in the construction charge for 1928. If we admit that the elimination of the cost of hand labor would assist in increasing the beet acreage, and this seems reasonable, it would be necessary to get an increased acreage of approximately 1,000 acres more than was grown in 1928 to bring this average charge back to \$1.25 per acre, and with an area of 7,000 acres the charge would be increased to \$1.37. Another point worthy of consideration in this connection is the fact that a high crop value gives a valid basis for holding up State and county taxes. A beet crop of 6,000 acres runs into \$150,000 for hand labor. Most all of this money is spent in the community, but the beet grower receives no direct benefit therefrom.

Most of the beets are grown on class 1 and 2 lands, and if any allowance is made it would benefit the land paying the high charges. This concession requires no change in existing law or regulations, but rests solely with the Secretary of the Interior. I recommend that it be granted.

#### 20. ASSOCIATE COUNTY AGENT

There is a real need for an associate county agent on the lower Yellowstone project to help with the economic development. It is understood that Federal funds are available for this service, which would be under the supervision of the State extension service. In the assignment of a man to other Federal projects it has been necessary to secure sufficient money from other sources to pay auto-travel expense. On this project it might be impossible to have the county commissioners in Richland County, Mont., and McKenzie County, N. Dak., assume this obligation. If this can not be taken care of by the State extension service or the counties, then it should be done by the irrigation district or the Bureau of Reclamation. If it can not be done by paying mileage on a private car, then it could be done by furnishing a Government car.

The personal contact of the right man would be worth many times his cost. The project has many well-developed farms that are following a profitable system of agriculture. This knowledge should be put across to the man who is not handling his farm as it should be farmed. Too often it happens that the poor farmer does not know where to go to get assistance, and the prosperous farmer does not have the time to help the man who needs help. There is a world of work that can be done by such a man in farm development, improved irrigation practice, improvement of livestock, feeding, and cooperative marketing. It is my opinion that this man should be furnished by the State extension service and his salary paid by the Department of Agriculture rather than by the Bureau of Reclamation. Past experience has shown that a man in such a position is working under a handicap when the farmers know that they are paying his salary.

#### 21. CONCLUSION

The investigation of the lower Yellowstone project was confined chiefly to such features as could and should be improved. Most of the subjects of the standard outline to be followed by investigators were not pertinent to conditions on the project and did not need to be considered. The project has made a good start in recent years. The sugar-beet crop for 1929 has been increased by 300 acres over the 1928 crop. The area in beans has nearly doubled. There were excellent crops of wheat and barley all over the project. The first cutting of alfalfa had gone into the stack in excellent condition, and on many fields the second crop will be ready to cut about the first of August. The record for 1928 shows only 19,770 acres irrigated out of 36,650 acres cropped, with an area of 58,250 acres for which water was available. But consideration must be given to the fact that in 1928 the rainfall during the growing season was over

12 inches, which would have a decided influence in reducing the area irrigated from the canal system. This year there will be a different story to tell, and the lower Yellowstone project, with its abundant supply of water, is going to make an excellent showing. I can see no need of any change in existing legislation. The passage of H. R. 156, providing for the disposal of public land classified as temporarily or permanently unproductive, would help in the disposal of some idle land. With a little help on the crop census and some aggressive work in disposing of delinquent lands the water users should be able to meet the contract payments. All things considered, the prospects for prosperity and success look reasonably good.

### RIVERTON PROJECT, WYOMING

(By Dr. Alvin Johnson, Associate Editor Encyclopedia of Social Sciences, New York)

The problem of Riverton is one of settlement. Except for hardly more than a dozen scattering farms on both private and public lands, the project is virgin territory. Over two-thirds of the land to be settled is Government land; the private land is cheap—\$10 to \$25 an acre and can not go much higher so long as equally good Government land is available. Riverton therefore offers unusual opportunity for community building.

Since construction is still far from completion and settlement has barely begun, all judgments as to the economic and social value of the project must rest on general considerations, not on realized results. No single farm on the project has been in operation long enough to develop full productivity, or to offer an empirical basis for determining the capital requirements of successful settlement. Much light on the problem may be had, however, from the adjacent privately irrigated lands. From the experience of the cultivators of these lands it may be inferred that the project lands would be capable of yielding satisfactory crops of alfalfa, sweet clover, beets, and beans from the second year of irrigation tillage, and that the 80-acre unit, when fully developed, would maintain a farm family on an American standard of living, while meeting all the water charges contemplated by the Government.

The soils within the project appear to be unusually good, especial care having been taken to exclude from the project soils with shale, sand, or excessive alkali, and those which are too shallow over impervious substructures. The desert vegetation on the land, as well as soil surveys, indicates that the soils are adequately supplied with the essential mineral constituents essential to fertility, although there is evidence from the adjacent privately irrigated lands that the phosphate content of the soil may in some cases need supplementing. The soils lack humus and nitrates—a defect that will cure itself rather promptly with good farming. Some of the soils are rather heavy and some too light, but there appear to be no soils so heavy as the gumbo soils of the Milk River or so light as the sandy soils of the North Platte. For the most part the surfaces are smooth and the slopes gentle. No great expenditure is necessary for leveling, and good irrigation technique would get the water over the land quickly and with a high degree of uniformity.

There can be no question that the Riverton project presents the necessary physical basis for the development of a successful farming community. Nor can there be any question that such a community is needed in the organic development of the adjacent territory. Riverton is surrounded by immense areas of thin pasture, suitable for sheep grazing, which maintain at present very considerable flocks of sheep grazing the highlands in the summer and existing in the winter on the dried grasses and salt sage of the more sheltered lower slopes and valleys. If winter feed were available, as will be the case when the project is fully developed, the number of sheep within a 50-mile radius could no doubt be doubled; moreover, early lambing would become practicable, with a notable increase in size and improvement in quality of the lambs shipped to market. The environs of Riverton have important mineral resources, whose exploitation will create a market for local food supplies, as will also the development of summer camps in the near-by mountains. A sound policy of State building will place a high value on the reciprocal relations between the irrigable territory of Riverton and the enormous area of semiarid lands surrounding it.

While the future of Riverton appears to be assured, there are at present several serious obstacles to settlement. Of these the most important is lack of railway transportation.

The project lands nearest to a railway station—and these are not yet ready for settlement—are 9 miles distant. This is too far for the profitable trucking of sugar beets. The average distance from the project farm units to Riverton, the nearest station, is at least 20 miles. So long as this transportation situation obtains, the agriculture of the project lands will have to be confined to dairying and stock raising, with the incidental production of small grain—mostly oats and barley for local consumption—bean and seed crops. Even with such an adjustment of production the distance to shipping points would be a serious handicap. The prospective settler probably overestimates the seriousness of the handicap; moreover, he takes account of the social disadvantages inherent in life 20 miles from the railway.

If the project were fully settled, it would be a profitable investment for the Northwestern Railway to run a branch line along the axis of the project. There are sufficient good beet lands in the project to supply the acreage needed for a factory, with its large volume of paying freight. But the Northwestern Railway is disinclined to build the railway ahead of settlement, and settlement waits upon the building of the railway. Meantime the Government's investment in diversion dam and canals and laterals remains unproductive.

Lack of railway transportation is not the only obstacle to settlement, although it is the most serious one. While the soils are no doubt productive, they vary widely, both physically and chemically, and the prospective settler can not be at all certain that any given tract will respond generously to his labor. In their present state the lands are rather forbidding to the eye. The small number of farms now worked give some evidence of productivity at isolated points, but with three or four exceptions these farms are not sufficiently supplied with capital to exhibit full results. It has been proposed repeatedly by the superintendent of the project that the Government should develop a sample farm as an ocular demonstration for prospective settlers. There can be no doubt that one or more such farms would be a profitable investment of reclamation funds, if the Government admitted the item of interest on its investment into its computations and counted delay in settlement as a pecuniary loss.

Indeed, if the Government admitted this business item into its computations it would go much farther and break up extensive tracts of land and put them under sweetclover or alfalfa at the earliest possible moment. It would greatly hasten the settlement of such lands, since the prospective settler under present conditions is repelled by the necessity of wasting a year in getting the raw land into shape for a crop.

A third serious handicap to settlement is the difficulty encountered by the settler in finding the money needed in preparing a farm unit for full production. Under the selective settlement plan, he is required to bring with him at least \$2,000 in cash or in farm equipment. Even this modest requirement greatly shortens the list of seekers of farm homes in a pioneer community. Nevertheless, it is far from enough. The new settler will require a house sufficiently well built to protect him against a rather bitter winter. He will require some sort of shelter for his stock, a well, and fences. In view of the distance to a railway station, some sort of motor vehicle, preferably a light truck, is indispensable. He will need to begin developing a herd of livestock. Until the end of his second year of farming he will have virtually nothing to sell, although he may supplement his living by growing a garden, milking a cow, and raising poultry. In any event he will have been forced to draw heavily on his cash capital for living expenses in the first 18 months, unless he secures employment outside of his farm, which in fact needs his whole time if it is to be made productive with reasonable promptness.

In the opinion of the superintendent of the project, as well as in that of well informed business men in the town of Riverton, the minimum amount of money required to assure the steady development of a farm unit on the project is \$5,000. I have examined the details making up these estimates and have satisfied myself that they contain nothing which is not absolutely necessary. Indeed, they presuppose on the part of the settler a degree of economy and good judgment which would make him a highly successful man in any agricultural community.

It may, however, be assumed that with \$5,000 at his command a good man will pull through and in the course of 10 years, develop a farm yielding a

good living. With the \$2,000 required under the selective settlement provision, a settler can have only the barest chance, unless he can find the other \$3,000 in the form of a loan with moderate interest and a moderately long term.

At the present time very little money is to be had in Riverton on any terms. The town itself has suffered for some years under financial depression, and private capital is in a weak state. Banking capital is scarce and dear; the rate of interest is 10 per cent and the maximum term six months. It is not a question of the greed of the money lenders. However public spirited the money lenders might be, there is not money enough in the county to supply the requirements of any considerable development of project lands.

#### CONCLUSIONS

Because of the heavy Government investment in irrigation works, on which sound business accounting would compute interest, every effort should be made to secure full settlement at the earliest possible date.

It is not worth while to devote money and effort to soliciting settlers under present conditions. The average selected settler with \$2,000 has so small a chance of succeeding that it is of doubtful morality to induce him to settle.

In order to create the conditions for successful settlement the Government should take the initiative in securing railway transportation and the provision of adequate credit resources.

With respect to railway transportation, it is probable that either the Northwestern or the Burlington could be induced to extend a branch line through the project, if assured that the Government was preparing to meet the other essential condition of settlement, namely, the provision of adequate credit for development.

In case neither railway were willing to extend a branch line, the Government should consider seriously building a branch line itself, which might be justified on the ground that it will greatly reduce the amount of trucking required in the construction of works for the remaining half of the project. Such a road could later be sold at cost either to the Burlington or the Northwestern.

The credit requirements of the Riverton project can be met only through some such provisions as are proposed in the Kenyon-Winter bill, setting apart reclamation funds for loans to settlers.

In order to abbreviate the unproductive period in a settler's tenure, which represents a heavy drain upon his capital or credit, the superintendent of the project should wherever practicable have the Government lands broken and prepared for water and put under alfalfa or sweetclover, the cost being assessed against the settler as an interest-bearing debt, quite apart from construction charges.

While the project requires also for full prosperity a beet-sugar factory, no action on the part of the Government is necessary to secure it, since one or another of the sugar companies would erect a factory as a matter of course as soon as it were assured of the minimum acreage. This minimum, the project lands could easily offer, once they were fully settled.

---

#### WILLWOOD DIVISION, SHOSHONE PROJECT, WYOMING

(By B. E. Hayden, Reclamation Economist, Bureau of Reclamation)

#### CONCLUSION

1. The soils of the Willwood division are reasonably fertile and will, from the beginning of cultivation, produce from fair to good crops under proper handling. On account of the close texture of the soil and the lack of humus, however, it is very essential that the lands be planted early to sweetclover or alfalfa and a farm program be adopted that will provide the lacking soil elements by plowing under green crops and by the application of barnyard manure.

2. Due to the selective method of settlement and minimum capital requirement followed in opening this division, progress in bringing the land under cultivation has been much more satisfactory than has been the result on other Government projects where anyone with a homestead right was permitted to make entry.

3. The quality of settlers is good, and their morale is excellent, but their capital is generally insufficient to enable them to put up the necessary buildings for properly housing themselves and their stock or for the purchase of livestock to consume the feed raised on their farms. To date only a very few fairly comfortable houses have been built, and no barns worthy of the name.

4. No source of credit exists at the present time for supplementing the farmer's capital and furnishing funds for the construction of farm buildings or for the purchase of livestock on terms of payment that can be met by the farmer. Such credit should be provided by the Government through the Bureau of Reclamation, since experience has shown that no other agency will furnish it and, furthermore, the Government holds a first lien on the land and is the party most interested in the success of the enterprise.

5. Until the farmers are able to produce better crops and feed such crops to livestock on their farms it will be impossible for them to pay anything on construction charges. It is necessary under present conditions for settlers to earn a portion of their living away from their farms.

6. Based on observations made on this project, it is believed that the Government should be prepared to finance the preparation of half of each unit for irrigation and to furnish 50 per cent of the cost of necessary buildings on 20 years' time with 8 per cent annual payments for interest and amortization of the debt.

7. In future openings, public notice should be issued not later than the middle of the year previous to the season when water will be available for irrigation and entrymen should be required to prepare 50 per cent or more of their land for crop the first season.

8. Farm unit surveys should be made and farm unit plats prepared a year or more in advance of the date of opening lands to irrigation.

9. Laws should be enacted by all arid-land States, providing for the assessment of benefits according to the ability of the land to pay charges and also providing for assessments against towns, nonirrigated lands, and other enterprises, according to the benefits received by reason of the irrigation works.

#### ECONOMIC SURVEY, 1929—WILLWOOD DIVISION, SHOSHONE PROJECT, WYOMING

The Willwood division of the Shoshone project comprises a strip of land about 16 miles long from east to west and has a north-and-south width of from 1 to 5 miles. It lies along the south bank of the Shoshone River, with the center of the tract about 3 miles east and 4 miles south of Powell, Wyo. The area falls within the conditions described in paragraph 2 of the outline for Economic surveys, 1929, which reads: "2. Projects now being constructed where the acre cost of water is so high as to raise the question of the ability of settlers to meet payments required by the district contract. Consideration should be given to the steps needed to promote early and complete settlement and the largest return from irrigation."

For convenience of settlement, the area is being developed in subdivisions which are placed on the market progressively. With the exception of a few hundred acres owned by the State, the whole area was public land.

The first unit, containing an irrigable area of 3,152 acres of irrigable land, was opened to settlement on May 11, 1927. It contained 40 farm units, 16 labor allotments, and 1 small tract of private land. To date, 27 of the farm units and 1 labor allotment have been filed on. Of these, one is subject to cancellation and one (an exchange entry) is being held without improvement. The rest are largely under cultivation this year.

The second unit, containing an irrigable area of 2,301 acres and comprising 28 farm units and 318.5 acres of State land, was opened to entry on June 25, 1928. To date, 10 of these units have been filed on. Five are practically fully cropped this year and two others are under preparation for crop next year. Two hundred and ten acres of State land has been sold and is being irrigated.

The third unit, with an irrigable area of 2,370 acres divided into 29 farm units, was opened to entry on May 10, 1929. No filings have been made to date.

The balance of the Willwood division, representing an irrigable area of approximately 4,170 acres, will be opened to entry when the units now available for settlement have been taken.

Twelve entries were allowed during 1927, 22 (including 1 farm labor allotment of 10 acres) during 1928, and 7 during 1929 to June 1. During the season of 1928 crops were grown on 1,104 acres, representing 21 farms and 1 farm labor allotment, with a total irrigable area of 1,523 acres.



By reference to the tabulation sheet at the close of this report, listing all filings allowed to date, it will be noted that 21 entrymen are actual settlers on the land, improving their places with the evident intention of establishing permanent homes on the land; 10 are improving with apparent intention of making a home at a later date; 5 are improving their places primarily as an investment; 1 is holding without improvement; and 3 are subject to cancellation.

The irrigable area of all units filed on, including 212 acres of State land, is 3,003 acres. The cropped area for 1929 is 2,378 acres. Deducting 232 acres, represented by the 3 units that have apparently been abandoned, from the total of 3,003 leaves 2,771 acres net, of which 2,378 acres are in crop. This showing of approximately 86 per cent cultivation during the third year after the first opening (actually the second year after the settlement began) is very encouraging and is due, no doubt, in a large measure to the new plan of selected settlement and minimum capital requirement.

Referring again to the tabulation of entries, it will be noted that 13 farmers out of 21 who grew crops in 1928 are borrowing an average of \$708 each in order to carry on their farming operations this year. Twelve pay 10 per cent interest on their loans, while one borrows from his folks back home at 6 per cent. Of the 8 who are not borrowing for this year's operations, 2 have leased their places for a term of years and are working elsewhere, 2 are farming on the Garland division, 1 with initial capital of \$6,100 recently bought another man's relinquishment, 1 with initial capital of \$3,900 (all negotiable) is riding ditch, while the 2 others show initial capital of \$6,165 and \$9,600. Only 1 man out of 21 made his living during the first season's operations from his farm, and he was the man with the initial capital of \$9,600. His per-acre crop value for the year was nearly \$31 while the average for all lands farmed was but \$11. His success was due in a large measure to the fact that he was able to prepare his land during the fall for the spring seeding. The very unsatisfactory crop returns for the first year's operations was due to poor preparation of seed bed, insufficient irrigation, poor leveling, and late seeding. If good crops are to be grown the first year it is imperative that the land be prepared for irrigation and plowed during the fall preceding the crop year.

At the close of this report is a tabulation of "Typical settlers with more than 50 per cent of places farmed in 1928," which gives a fair idea of the financial condition of settlers at the end of one year's operations. The actual present worth of settlers could not be obtained, but it was learned by conversing with individuals that those who are borrowing, with one exception, have no liquid assets and are depending on this year's crops, together with what employment they may be able to secure, to pay off notes and provide funds for living expenses until another crop can be produced. It will be noted that 81.4 per cent of the irrigable area of the farms listed was in cultivation during 1928; that the average value of gross crop per acre was \$12.13; that the average value of buildings per farm was \$679; that the average value of equipment, including work stock was \$1,164 per farm; that the average amount of borrowed money per farm was \$608; and that the capital requirement, in the judgment of the owners, to make the place a going concern in the near future is \$1,575 per farm.

It is the opinion of the author, unless some source of credit can be established through which money can be secured at low interest rates and on easy terms for providing the necessary buildings to make farms habitable by man and beast and to furnish capital for the purchase of feeders and dairy cows, few of the present settlers will be able soon to begin the payment of construction assessments, and some will experience difficulty in "carrying on" with only the water-rental charge of \$1.25 per acre to pay. Any credit that might be furnished, however, should be very carefully supervised and given only after an approved plan of farm operation had been adopted. Indiscriminate loaning of money without such safeguards would only invite disaster.

From this point forward, the outline for Economic Surveys, 1929, submitted by the commissioner will be followed.

1. "Have the economic and social benefits of this project justified its construction?"

The project is too new and the development too meager to permit either an affirmative or a negative answer to the question. However, on account of the rapid progress being made by settlers in bringing their farms under cultivation and the uniformly good soil and bountiful water supply, it is safe to assume that the project will become a prosperous agricultural district within a reasonable time if adequate financial support can be secured to carry the farmers past the first few years of low production.

2. "What are its opportunities and what ought to be done to enable these opportunities to be fully utilized?" "What are its profitable crops and what kind of agriculture ought to be promoted?"

This district is favored with good soil, good topography, excellent water supply and drainage conditions, a reasonable distance from railway facilities and close proximity to outside range for cattle and sheep. To make the best use of these advantages, it will be necessary for farmers to go largely into the production and feeding of livestock and into dairying. Practically all are working with such prospect in view, but on account of limited means and inability to secure adequate financial assistance even at high rates of interest, are making slow progress. The organization of an agency to furnish needed capital would materially hasten the prosperity of the district. Crops that can be grown with profit under a proper system of rotation and fertilization are: Beans, peas, potatoes, small grains, sweetclover for pasture, root crops, and alfalfa. In order that any of the crops mentioned may be grown at a profit, it will be necessary that practically all grains, alfalfa, and root crops, except potatoes, be fed on the farm to increase and insure the fertility of the soil and to secure at the same time the greatest cash value for all crops produced. Distance from railway facilities prevents the production of sugar beets for market at a profit on more than a few hundred acres.

3. "How much of the unsettled, undeveloped land is sufficiently productive to justify settlement under present agricultural conditions? What should be done with the unproductive land?"

Apparently, all of the irrigable area of this district is suitable to agriculture and may be farmed successfully. No land should be thrown out at the present time.

4. "How far has delayed settlement been affected by: (a) Defects in soil, (b) climatic conditions, (c) remoteness from developed communities and lack of markets, (d) lack of capital on part of settlers, (e) amount of water charges, (f) local taxation, (g) lack of credit, (h) health conditions, insect pests, and plant and animal diseases?"

Not at all by (a), (b), and (h). (c) Distance from railroad, rendering unprofitable the growing of sugar beets for market, has undoubtedly kept out some good prospects. (d) Lack of capital has caused a few settlers to delay the development of their entries somewhat, but it is not believed that it has, to any appreciable extent, prevented prospective settlers from filing on the land. (e) A number of the settlers have mentioned the high construction cost (\$125 per acre) as a heavy burden on settlers, but so far no assessments have been made to recover this cost, and while it may have discouraged some good men from making entry, certainly it has had no bearing on the success of present settlers. (g) Lack of credit has probably had no effect on the settlement of the district, but will undoubtedly have considerable influence on the retention of settlers after their available capital has been used for improvements, equipment, etc.

5. "Can the irrigation payments required under present conditions be made by the people now on the project? What is being done and what should be done to insure the settlement and cultivation of land delinquent in State and county taxes and irrigation charges? Should the Bureau of Reclamation be given authority to acquire title to land through purchase of tax certificates and thus become an active settlement agency?"

The above condition does not apply at present to the Willwood division. The only water assessments made against the land at the present time is an annual water rental of \$1.25 per acre. However, before settlers can hope to be able to meet the additional cost of approximately \$3 per acre for construction, which presumably will be assessed within a few more years, they must have their farms in full cultivation and stocked with sufficient dairy cows, sheep, or hogs to consume practically all crops grown.

No lands are delinquent in State and county taxes or irrigation charges.

The author has always advocated a law permitting the Bureau of Reclamation to acquire title to land through purchase of tax certificates as a remedy against continued delinquency. It is believed, however, that the district organizations should be encouraged to take that responsibility.

6. "If more construction work is asked for by the project water users, what will it cost? Is it needed; and will it be paid for in accordance with the reclamation act?"

This question is not applicable, since the project is not yet completed and presumably adequate allowance has been made for all necessary construction costs, including drainage.

7. "How much capital is required to purchase a farm of unimproved land and bring it to full production? How much of this capital should a new settler possess at time of settlement? How much credit is required and upon what terms?"

All the lands on this division at the time of public notice was Government land except 318.55 acres owned by the State and 11.65 acres of private land. State lands have been sold at \$10 per acre on long-time amortized payments at 6 per cent.

The amount of capital required to develop State lands under present terms of sale are but little different from that required to develop Government land.

In the opinion of the author, a purchaser of 80 acres of raw State or private land will have a minimum capital requirement as follows:

Cash payment on land	\$100
House	500
Barn and cow or sheep shed	500
Garage and machinery shed	300
Granary	150
Fencing	250
Shallow well and pump	30
	<hr/> \$1,980

Farm equipment:	
4 horses	300
2 sets harness	100
1 light automobile	400
1/2 interest hay stacker	70
1 sweep rake	75
1 dump rake	55
1 mower	100
1 low-wheeled wagon	70
1 hay rack (home made)	25
1 two-way plow	120
1/2 interest disk harrow	70
1 peg harrow	25
1/4 interest grain drill	40
1/4 interest bean and beet drill	30
1 land leveler	10
1/2 interest manure spreader	100
	<hr/> 1,590

Livestock:	
2 milk cows	150
50 hens	50
1 brood sow	30
	<hr/> 230
Household equipment	350
Incidentals and living expenses	500
	<hr/>

Total 

---

 4,650

The capital requirement shown above is more than double that required of settlers for public-land filings on Government irrigation projects, but is believed to represent practically the minimum where a reasonable degree of success may be expected without undue hardship and privation on the part of the settler.

In addition to the capital requirement listed, credit should be available at reasonable interest rates for financing farmers in livestock feeding operations and in the purchase of dairy cattle.

8. If the settlers' capital needs to be supplemented to improve and equip farms, where can credit for this be now obtained and what additional credit should be provided? What agency should furnish this credit?

Credit facilities for supplementing the farmer's capital are at present available to a small extent only and then at high interest rates. One of the local banks at Powell, Wyo., has made loans of from \$500 to \$1,000 each to a majority of the settlers on this division on their personal notes and chattels for financing this year's farming operations. The rate of interest is 10 per cent. The

other bank at Powell is prepared to supply credit for feeding operations where the farmer owns the feed. The interest rate charged by this bank also is 10 per cent. The State of Wyoming will make loans to settlers on patented land at  $6\frac{1}{2}$  per cent for interest and amortization covering a period of 30 years. The Federal land bank will also make loans when lands are patented and conditions become satisfactory to the board, but is making no loans at present. The Washakie Livestock Loan Co. of Worland, Wyo., writes:

"Wish to advise you that we are in position to make loans on livestock in any part of the State. The interest rate is 8 per cent, paid in advance to maturity, notes are for 6, 9, or 12 months. On the feeder loans where the borrower is experienced and has ample feed we will advance the full purchase price; on range or farm loans the amount per head to be loaned depends upon the appraised value and the conditions surrounding the loan. Upon maturity the loan may be renewed as long as the security remains ample.

"Will be glad to furnish any additional information that you may desire if you are interested.

"Yours truly,

"WASHAKIE LIVESTOCK LOAN CO.,  
"JAS. W. BOOTH."

Answering the question directly, no agency exists at present through which the settler may secure capital with which to improve and equip his farm.

Due to the fact that title still remains in the United States for practically all of the lands in the district and that a first lien of about \$125 per acre for construction costs on all of the area is reserved, it does not seem probable that any private or State organization could be formed to advance money for improving and equipping farms. The practical and apparently the only solution of the problem would be for authority to be granted and funds provided by Congress by means of which the Bureau of Reclamation could furnish such credit under proper safeguards and restrictions.

It is the opinion of the author that the Bureau of Reclamation should be authorized to give financial assistance in clearing, leveling, and preparing Government lands for crops and irrigation, and to furnish 50 per cent of the capital required for necessary buildings on the basis of 8 per cent annual payments for interest and amortization, effecting the liquidation of the debt in 20 years.

9. "Beet-sugar companies assign from 6 to 12 experienced field men to the territory served by each factory to assist farmers in selecting fields to grow beets; give advice in preparing seed bed and on other farm operations. This assures good farm practice and has increased the average yield of beets. This is regarded as a profitable expenditure on the part of the sugar-factory management. The Bureau of Reclamation has a great deal more at stake. Should it render a similar service to assist settlers in working out farm programs and in the organization of cooperative marketing agencies? The bureau has been unable to do this because the expense would have to be met by increased charges to the settlers. The Agricultural Department can render such a service because it is provided with funds which do not have to be repaid. Should not the Bureau of Reclamation be given funds on the same terms, or, if not, should not the operation of projects and responsibility of collecting the money due the Government be turned over to others?"

The practice of beet-sugar companies in furnishing trained field men to supervise the growing of beets rests primarily on contracts entered into between the company and the grower wherein each agrees to perform certain obligations. The farmer agrees to grow beets under supervision on a definite acreage and the sugar company agrees to furnish seed, procure the hand labor required, and buy the beets at a specified price per ton. The performance of certain acts and obligations by the sugar company puts the farmer in a frame of mind to submit to supervision for the growing of a certain crop. The same condition results where canning companies furnish seed and contract for the crop at a definite unit price.

In order that the same degree of cooperation might be secured between farmers and a Government agency that ordinarily exists between farmers and private concerns, some special service of obligation would have to be given by the Government, such as furnishing capital for farm buildings or for the purchase of livestock. Any such transaction would have to be covered by a contract giving the Government agency a definite amount of authority in helping the farmer plan his crop rotation and stock-feeding operations. It is doubtful

if such a plan could be carried out successfully. It is believed, however, that the Bureau of Reclamation should have one or more competent agriculturists on each project to act in the capacity of adviser to farmers in helping to plan their farm operations and stock-feeding programs, to develop markets and establish cooperative-marketing organizations, and to assist prospective settlers in securing land and locations suitable to their particular endowments. The salaries and expenses of such men should be paid by special appropriation in the same manner that employees of the United States Department of Agriculture are paid. The benefit is no less general.

It is the opinion of the author, based on many years of observation covering, to some extent, nearly all Government Irrigation projects, that the business affairs of the bureau, including the collection of charges, can be administered most efficiently by its own agencies. Districts organized under State laws have been fairly successful to date in making collections due the Government, and it is hoped that they may prove more efficient collectors in the future, but until all obligations are fully met the bureau should be prepared to enforce the provisions of contracts made.

10. "Would there be any gain to the settlers and to the income from projects if the works when constructed were turned over to the State for settlement and development and for the repayment to the Government of the construction debt?"

Should completed projects be turned over to States for settlement and development and State agencies intrusted with the repayment to the Government of construction charges, it is altogether probable that the settler would profit by the nonpayment of charges, for it can hardly be assumed that the State would prove to be as capable a collector as the Government. For the same reason, it is doubtful if the debt to the Government would ever be fully paid. Local agitation and political pressure would prove an insurmountable obstacle to collection. No; it is the opinion of the author that such a plan would accomplish nothing and would prove disastrous in the end.

11. "Recommendations should be made regarding any changes in laws or practices of the bureau or of the settlers which the investigator believes should be carried out."

It is recommended that future openings of public lands under irrigation projects be made not later than August 1 of the year next previous to the year in which water will be available for irrigation to give time for leveling and preparing during the fall a considerable part of the land for the next year's seeding. The settler should be required to plow and prepare during the year in which filing is made 50 per cent more of the unit for crop the following year, thus practically insuring a good crop the first year. Such requirement would be particularly desirable in case funds had been advanced by the Government for improving the unit.

Laws should be enacted by all arid-land States providing for annual apportionment of benefits according to the earning power of the land. Assessments should be made and collections enforced by the district boards. The Bureau of Reclamation should foster such legislation.

The reclamation law now provides for the fixing of different construction charges against different classes of land. The theory is correct, but its application is unworkable. No soil expert or agriculturist has sufficient knowledge and acumen to forecast the ability of lands to produce crops or the relative value of such crops as may be adapted to lands of different character. At Willwood an attempt has been made to do this and to equalize burdens by graduating construction charges between \$69 and \$125 per acre. This plan is sure to result in requests being made by the settlers with high-priced water rights for adjustments downward when their lands fail to produce proportionately greater crops than is produced on the lands having the lighter charge. Their requests will be supported by data giving comparative yields and values. This condition could be avoided if all irrigation States would enact legislation similar to the Wright Act of California, which provides for the annual apportionment of benefits. Another important feature of this act is its provision for the assessment of benefits against towns within the district so that the burden of development may be borne equitably by all classes of industry served.

When new projects are proposed for construction by Government funds lands should be classified as to suitability for irrigation and agriculture and should be appraised at their actual value without reference to irrigation from Government works. Appraisals made on projects now under construction did

not conform strictly to this rule because differences in soil and topography make wide variations in the value of land under irrigation, but have little effect on its value for grazing purposes, and an attempt was made to partially adjust this difference in appraisal values. Another reason for not following closely such a rule was the uncertainty of whether construction charges would be based on the ability of the land to produce. If apportionments of benefits were made annually by the district the variation between land values would be minimized and would result in a great saving in first cost of land to the settler. It would permit the adjustment of errors previously made and would avert controversies with excess landowners brought about by changes in irrigable area when final surveys were made.

Farm-unit subdivisions and irrigable-area surveys should be made and farm-unit plats prepared well in advance of public notice that water is ready for delivery. Many difficulties would be avoided and much confusion prevented if such practices were followed.

No.	Name	Net worth shown on application			Entry allowed	Residence established	Irrigation area	Cropped 1928	Cropped 1929	Acre crop value	Acre cost of clearing and leveling	Value of—		Capital needed			Indebtedness		Farms other land	
		Cash and securities	Other assets	Total assets								Buildings	Equipment	Improvements	Equipment	Livestock	Amount	Rate, per cent		
1	H. A. Galvin <sup>1</sup>	5,300	4,300	9,600	7/19/27	7/1/27	75	63	75,830	\$4.00	\$1,200	\$1,500	Was not viewed	Was not viewed	Was not viewed	inter-			Yes	Lives on Garland division.
2	F. D. Gentry <sup>1</sup>	250	3,210	5,460	9/24/28	3/1/28	79	78	78	4.00	125	1,000	82,000	82,000	82,000		\$700	10	Yes	Do.
3	Clay Miller <sup>1</sup>	1,500	4,330	5,830	7/15/28	3/1/29	78	78	78	4.00	125	1,000	82,000	82,000	82,000		\$700	10	Yes	Runs school bus. Has house and lot in Kansas.
4	A. L. Caraveau	1,600	3,740	5,140	9/16/27	3/1/28	71	39	71	8.70	670	1,070	1,000	1,000	1,000	\$300	800	10	Yes	Rents to Schmidt.
5	F. E. Schmidt <sup>1</sup>		3,355	3,355	9/16/27	10/1/27	84	15	43	4.30	3.00	1,100	600	1,000	400	400	800	10	Yes	Rides ditch.
6	R. W. Berg <sup>1</sup>	300	3,350	3,650	9/16/27	10/1/27	80	65	80	5.00	225						800	10	Yes	Rents to Schmidt.
7	M. Christopherson <sup>1</sup>	Exchange entry.	Exchange entry.	Exchange entry.	9/16/27	3/1/28	81	50	71	7.24	6.00	1,000	750	800	500	500	800	10	Yes	Rides ditch.
8	J. H. Higgins <sup>1</sup>	5,955	5,955	11,910	11/25/27	3/1/28	79	76	76	14.40	5.00	805	1,500	700	1,000	1,000	600	10	Yes	Works out part time.
9	L. B. Higgins <sup>1</sup>	375	1,875	2,250	11/25/27	3/1/28	78	74	78	17.70	3.00	206	800	500	400	1,000	300	10	Yes	Bought relinquishment of Anderson.
10	E. F. Lutz <sup>1</sup>	2,300	3,800	6,100	2/6/29	3/1/29	74	59	74	4.35	277	1,035	1,500	250	150	150	115	10	Yes	No improvement.
11	M. E. Murphy <sup>1</sup>	Exchange entry.	Exchange entry.	Exchange entry.	9/29/27		78							Was not viewed	Was not viewed					Has \$1,140 in U. S. bonds. Rides ditch.
12	O. W. Dugan <sup>1</sup>		3,070	3,070	10/3/27	3/1/28	69	69	69	10.40	5.00	510	2,300	750	400	400	900	10	Yes	Rents to Galvin.
13	E. E. Henry <sup>1</sup>	100	2,177	2,277	12/1/27	3/1/28	77	13	76	2.00	250	325	550	100	100	1,000	600	10	Yes	
14	Q. A. Royal <sup>1</sup>		2,475	2,475	12/21/27	3/1/28	60	50	60	10.00	10.00	330	450	1,000	650	1,000	600	10	Yes	
15	J. W. Mangin <sup>1</sup>	Exchange entry.	Exchange entry.	Exchange entry.	11/29/27		70	32	70	13.90	12.00	1,078	1,500	400	500	1,300	1,000	10	Yes	
16	J. W. Rimbley <sup>1</sup>	3,300	3,300	6,600	1/23/28	3/1/28	82	55	82	13.80	12.00	1,078	1,500	400	500	1,300	1,000	10	Yes	
17	Geo. W. Eggerman <sup>1</sup>	6,165	6,165	12,330	1/23/28	3/1/28	79	50	79	3.20	5.00	125	1,350	1,100	500	250	500	6	Yes	
18	H. L. Patterson <sup>1</sup>	850	2,585	3,435	3/12/28	10/1/28	77	60	77	5.16	4.00	836	250	500	250	250	500	10	Yes	
19	N. A. Reed <sup>1</sup>	380	7,645	8,025	3/12/28	3/1/28	71	70	70	12.50	3.00	400	1,250	400	3,000	1,000	1,000	10	Yes	
20	A. E. Reed <sup>1</sup>	250	4,355	4,605	3/12/28	3/1/28	59	59	59	12.60	4.00	985	1,250	500	3,000	1,000	1,000	10	Yes	
21	Jesse V. Goodwin <sup>1</sup>	150	2,300	2,450	3/12/28	3/1/28	64	54	64	6.10	4.00	225	800	1,000	600	1,000	500	10	Yes	Rides ditch. Will lease the place.
22	H. K. Morgan <sup>1</sup>	3,900		3,900	4/14/28	12/1/28	68	60	60	6.10	4.00	150	200				500	10	Yes	
23	S. W. Clark <sup>1</sup>	200	2,312	2,512	4/18/28	4/18/28	71	60	60	10.70	4.00	250	450	500	500		500	10	Yes	Father and son farm together.
24	L. P. Christensen <sup>1</sup>	335	2,633	2,968	7/2/28	4/1/28	56	30	56	12.60	5.00	500	1,100	300	2,000				Yes	
25	A. N. Christensen <sup>1</sup>	300	2,958	3,258	4/18/28	4/1/28	52	50	60	12.60	4.00	75	1,000	1,500	2,000		300		Yes	
26	H. F. Carter <sup>1</sup>	150	2,810	2,960	9/4/28	3/1/29	77	72	72	5.00	5.00	600	500	125	150		300		Yes	
27	G. C. Lutz <sup>1</sup>	1,600	475	2,075	8/13/28	3/1/29	72	72	72	4.50	4.50	400	475	475	1,050	150			Yes	Subject to cancellation.
28	Collin Anderson <sup>1</sup>		5,525	5,525	8/29/28		78												Yes	

<sup>1</sup> Actual settlers improving places.<sup>2</sup> Improving with apparent intention of making a home later on.<sup>3</sup> Holding without apparent intention of making a home later on.<sup>4</sup> Holding without improvement.<sup>5</sup> Subject to cancellation.



No.	Name	Net worth shown on application			Entry allowed	Residence established	Irrigation area	Cropped 1928	Cropped 1929	Acre crop value 1928	Acre cost of clearing and leveling	Value of—		Capital needed			Indebtedness		Farms other land	
		Cash and securities	Other assets	Total assets								Buildings	Equipment	Improvements	Equipment	Livestock	Amount	Rate, per cent		
29	A. J. Meyer <sup>1</sup>	450	2,625	3,075	9/10/28	10/1/28	73	35	35	—	5.00	575	400	600	500	300	—	—	Yes	Drag-line oiler.
30	L. E. Earhart <sup>2</sup>	—	2,400	2,400	4/17/29	4/17/29	55	47	47	—	—	—	—	—	—	—	—	—	Yes	Subject to cancellation.
31	A. Kincaid <sup>3</sup>	—	4,420	4,420	10/4/28	10/4/28	75	—	—	—	(6)	200	—	—	—	—	—	—	Yes	Irrigation manager, Garland division.
32	J. O. Ronch <sup>4</sup>	—	Exchange entry	—	3/19/29	—	78	—	—	—	—	—	—	—	—	—	—	—	—	—
33	W. W. Anderson <sup>1</sup>	—	do.	—	3/26/29	—	73	73	73	—	10.00	—	3,000	1,000	—	—	1,800	10	Yes	—
34	John F. Thayer <sup>1</sup>	350	3,440	3,796	10/1/28	3/1/29	81	81	81	—	4.50	400	1,500	1,000	—	—	400	10	Yes	—
35	F. H. Manney <sup>1</sup>	350	3,330	3,680	10/2/28	12/1/28	86	86	86	—	4.00	750	1,400	300	—	1,000	800	—	Yes	—
36	L. I. Valentine <sup>1</sup>	50	5,650	5,700	11/5/28	—	79	—	—	—	—	100	—	—	—	—	—	—	Yes	Subject to cancellation.
37	Terrance Moore <sup>1</sup>	50	2,240	2,290	4/1/29	4/1/29	77	77	77	—	—	350	—	550	1,250	—	—	—	Yes	Drag-line operator.
38	W. Thornberry <sup>1</sup>	200	4,300	4,500	4/29/29	4/29/29	75	50	50	—	8.00	—	1,000	500	—	—	—	—	Yes	Rented to Earl Myrray with option of purchase.
39	E. W. Davis <sup>1</sup>	—	State land.	—	3/29/29	—	80	80	80	—	7.00	10	—	—	—	—	—	—	Yes	Purchased on contract. Works on drag-line.
40	Don C. Wright <sup>1</sup>	500	1,000	1,500	5/22/29	5/22/29	132	130	130	—	4.00	300	1,000	300	—	—	200	6	Yes	—
41	G. A. Caraveau <sup>1</sup>	—	1,100	1,100	7/2/28	3/1/29	10	10	10	—	Farm-labor allotment	—	—	—	—	—	—	—	—	—
							3,003	1,104	2,378	11.00	—	14,550	20,855	20,725	7,050	15,600	13,900	—	—	—

<sup>1</sup> Actual settlers improving places.

<sup>2</sup> Improving with apparent intention of making a home later on.

<sup>3</sup> Improving without apparent intention of making a home later on.

<sup>4</sup> Subject to cancellation.

<sup>5</sup> A. Wilder.

NOTE.—Equipment includes work stock.

*Typical settlers with more than 50 per cent of place farmed in 1928*

Name	Assets at time of filing	Irrigable area, acres	Cropped area, 1928	Cropped area, 1929	Gross re- turns, 1928	Per acre crop value, 1928	Value of—		Capital re- quire- ment	Bor- rowed money	Inter- est rate, per cent
							Build- ings	Equip- ment			
H. A. Calvin.....	\$9,600	75	65	75	\$1,910	\$30.80	\$1,200	\$1,500			
A. L. Caraveau.....	5,140	71	39	71	339	8.70	670	1,070	\$1,900	\$800	10
M. Christopherson (1)	81	50	71	362	7.25	1,000	750	1,775	800	100	10
J. H. Higgins.....	5,955	79	76	76	1,094	14.40	805	1,500	1,700	600	10
L. R. Higgins.....	2,250	78	74	78	1,308	17.70	206	800	1,900	300	10
O. W. Dugan.....	3,070	69	69	69	571	10.40	510	2,500	1,550	800	10
Q. A. Royal.....	2,475	80	50	60	270	5.40	330	450	2,650	600	10
J. W. Rimbe.....	3,300	82	55	82	760	13.80	1,078	1,500	400	1,000	10
Geo. W. Eggerman	6,165	79	50	79	160	3.20	125	1,350	2,900		
H. L. Patterson.....	3,435	77	60	77	310	5.16	836	250	750	500	6
N. A. Reed.....	8,025	70	70	70	874	12.50	400	1,250	400	1,200	10
A. E. Reed.....	4,605	59	59	59	743	12.60	985	1,250	3,000	600	10
Total.....	\$4,020	880	717	867	8,701		8,145	13,970	18,925	7,390	
Average.....	4,911	73	60	72	725	12.13	679	1,164	1,575	608	10

<sup>1</sup> Exchange entry; assets not required.<sup>2</sup> Borrowed from relatives.

## OWYHEE PROJECT, OREGON-IDAHO

(By A. C. Cooley, Senior Agricuturist, Department of Agriculture, in charge of demonstrations on reclamation projects; Rhea Luper, State Engineer of Oregon; Prof. W. L. Powers, Chief of Soils, Oregon State College; and L. R. Brethaupt, Extension Economist, Oregon State College.)

## INTRODUCTION

An economic survey of reclamation was conducted during the summer by the Bureau of Reclamation. It included several Federal and private irrigation projects. The Federal projects surveyed were those under construction where the estimated cost seemed excessive and those upon which the agricultural and economic conditions were unsatisfactory. The private projects included were some that were in financial difficulty and were asking aid of the Government.

The Owyhee project now being built at an estimated cost of approximately \$18,000,000 was included in the study at the request of the Secretary of Interior because of its seemingly high cost and because the Indian Service has a plan to construct a dam on the headwaters of the Owyhee River which would impound sufficient water to provide for the development of 25,000 acres of land on the Western Shoshone Indian Reservation in Duck Valley.

The committee selected to make the investigation consisted of A. C. Cooley, senior agriculturist of the United States Department of Agriculture, Dr. W. L. Powers, chief of soils, Oregon State College; Rhea Luper, State engineer of Oregon, and L. R. Brethaupt, extension economist, Oregon State College.

The work of the committee was confined largely to a study of the local conditions and reports bearing upon the situation. The soil reports by Strayhorn, Hayden, and Johnson were checked and the water-supply data reviewed.

Local farmers and business men were interviewed with reference to the present agricultural and economic conditions. Inquiry was made into the opportunities that the project would offer to new settlers for success and thus insure to the Government the return of its investment.

In reviewing the feasibility report made in 1925 the committee finds the conditions set forth in that report to be still very representative of the present conditions. Therefore this report will not attempt to cover the same material again in such detail. It concurs in general with the conclusions reached and recommendations made.

A separate report was made on Duck Valley.

## CONCLUSIONS OF THE ECONOMIC SURVEY

1. The committee, after checking carefully the feasibility report of the Owyhee project made in 1925 and other data, finds no changes in the agricultural and economic situation of sufficient importance to justify changing the general conclusions and recommendations of that report. In the main the committee concurs in the previous report.

2. The project has been reduced from an estimated area of 139,560 acres to 111,000 acres plus supplemental water for about 13,000 acres under the Owyhee ditch. Besides the Owyhee ditch lands approximately 41,000 acres are now under cultivation. The lands are fertile and among the best to be found in the Snake River Valley. They have an elevation of 2,200 to 2,500 feet, with an annual average precipitation of 8 to 10 inches. The growing season between killing frosts averages between 140 to 160 days.

3. Building of the project will bring relief in reduction of water charges to about 600 farmers who are now dependent upon water pumped from the Snake River with expensive electric power. Without this relief they must eventually fail. It will also make available for settlement about 70,000 acres of highly productive new land and would insure more permanency and prosperity to several small cities located within the confines of the project.

4. During the 39-year period of 1890 to 1928 run-off records are available for 29 years. An analysis of these records of the water supply shows a probable shortage in farm delivery of 25 per cent in the year 1924 and 60 per cent in the year 1926, with a possible shortage of three other years, none of which would have reached the proportions indicated for 1926.

5. An annual depletion of 30,000 acre-feet has been allowed, which will provide for probable development in Duck Valley, Jordan Valley, and smaller divisions.

6. The total estimated cost of the project is \$18,000,000. Of this, \$300,000 is allocated to the Owyhee Ditch Co., and developed pump lands are given an allowance of \$15 an acre because of constructed distribution systems. It is recommended that an equitable adjustment in construction cost should be made between first and second class lands, based upon a detail soil survey and classification.

7. The new lands included in the Owyhee have fair to good natural drainage and are generally free from harmful alkali accumulation. The sum of about \$10 per acre for land not yet drained has been included in cost estimates. Where drains constructed by any of the district of the project at their own cost may be utilized, either as outlets for the proposed drainage of higher lands or as any part of the drainage system of the entire project, as drainage investigations may disclose, an equitable adjustment should be made with said districts in the construction cost charged against their lands for said drains.

8. The average duty of water is estimated at  $3\frac{1}{2}$  acre-feet per acre delivered to the farm head gate. The project is designed to deliver by gravity, not including reuse, 3.22 acre-feet per acre to 100,000 acres and the same amount by pumping to 11,000 acres. An additional 21,000 acre-feet is also provided for the Owyhee Ditch Co. The balance must be supplied from recovered water and further pumping.

9. The lands of the project under good management are capable of producing high yields. The most successful farming enterprises will be built around the livestock industries, with some income from cash crops. Dairying should be the main livestock enterprise, with small flocks of sheep, swine, and poultry as secondary enterprises.

10. Surplus power from proximate Government power plants should be furnished to the settlers upon pumping districts of the project as a measure of relief from the present prohibitive commercial power rates now being paid. Surplus power from Government power plants is inadequate for the needs of these pumping units; therefore, development of power at the Owyhee Dam for such purpose is urgently recommended.

11. Factors which should encourage development are good soil, desirable climate, well-settled communities, good highways, good railroad transportation, all of which are found on the Owyhee project. The seemingly high cost for construction and the availability of improved lands in other sections may be retarding factors in the settlement of the project.

12. Settlers should be selected carefully with reference to experience, capital, and other desirable characteristics. A thousand or more settlers will be re-

quired to fully settle the project. Generally, the settler, to be successful, should have \$5,000 or more in cash or its equivalent in livestock and equipment. Prompt settlement of the project is necessary to its success and will be greatly aided by the cooperation of all State settlement agencies, which is assured.

13. Trained agricultural advisors will be needed and should be provided for the assistance of the settlers.

14. Economic conditions have improved since the last report was made. Bankers and business men report collections much better, and the county records show an improvement in the percentage of taxes paid. Mortgages, however, are still found on a large portion of the improved farms.

15. General taxes will range from \$2 to \$3 per acre on improved land, with an average of approximately \$2.50 per acre.

16. The principal crops are alfalfa, red clover, pasture, corn, potatoes, and the small grains. It is important to the success of the project that a very high percentage of the total acreage shall be devoted to these crops, although apples, prunes, and some truck crops are grown commercially.

17. The average yields on class 1 land are: Alfalfa,  $4\frac{1}{2}$  tons; clover seed, 4 bushels; wheat, 40 bushels; barley, 40 bushels; corn, 50 bushels; potatoes, 125 hundredweight. Yields on class 2 lands are estimated at 75 per cent of the above.

18. Gross value of crops produced on class 1 land under good management is estimated at \$45 per acre and on second class at \$35 per acre, with an average of about \$40 per acre for the project.

19. Contracts with the landowners requiring the sale of surplus lands at the appraised value of from \$5 to \$15 per acre for irrigable land and at from \$1 to \$2 per acre for nonirrigable land have been made, with a further provision that on resale one-half of the increase in price shall be paid to the Government to apply on the construction cost. The disposal of lands in accordance with this appraisal should be strictly adhered to and is one of the most important factors in the success of the project.

20. Distance from markets makes it important that farm products be converted into concentrated form.

21. Some agency should be financed and empowered to acquire title to land through purchase of tax certificates and authorized to place new settlers thereon.

22. Operation of the project should be turned over to the water users as soon as practicable.

23. The project was originally recommended for construction on a basis that the cost would be returned to the Government by annual payment of 5 per cent of the gross acre income. We, therefore, recommend that legislation be reenacted to this end.

Should Congress not see fit to so authorize as an alternative recommendation, it is urged that public notice be deferred until the project is completed, and during construction water be furnished under the provisions of the extension act and upon a rental basis. Public notice when given should provide for carefully graduated payments so that those required during the first 20 years shall be based upon the then present state of development of the project.

24. It is also recommended that the construction of the distribution system to any unit of the project whose lands may be heavily encumbered by bond and warrant indebtedness as to make the payment of construction charges in addition to the full-bonded and warrant indebtedness impossible be deferred until a satisfactory compromise settlement is made between the districts in such units and their bond and warrant holders which will insure the solvency of such district.

#### LAND CLASSIFICATION AND SURVEY

In making the soil survey and classification blue-line topographic sheets showing streams and other landmarks are used. Maps used for new lands were on a scale of 2 inches to the mile and on pump lands 4 inches to the mile, except for the Gem district, where the field sheets are 1,000 feet to the inch. The land included within the boundary of the project was classified into one of six classes, based upon quality of soil and subsoil, topography, drainage, relative freedom from alkali, and accessibility. The primary object in the classification was to select acreage from the best soils sufficient to utilize the available water supply.

*Class 1 (irrigable).*—This class represents the best agricultural land in the project, including productive soils with smooth topography and fair to good depth, free from harmful quantities of alkali, and with drainage conditions such that productivity is not likely to be limited appreciably by seepage. The best land in the Gem unit in the native condition supports the growth of shade and sage and is not regarded to be fully as high in quality as the smooth, black sage land.

*Class 2 (irrigable).*—In this class is included productive areas which have, by reason of less fertile soil, rougher topography or less perfect natural drainage conditions or remote location or moderate depth or a combination of more than one of these conditions less agricultural value than class 1. Much of the class 2 land is of the same soil type as class 1 yet the cost of clearing and fitting for irrigation and more detailed attention required in handling this land under irrigation make it less desirable than class 1. The cost of fitting class 2 land for irrigation so that it will be nearly equal in productiveness to class 1 land is estimated at \$20 to \$25 an acre more than the cost of preparing class 1 area. Class 2 land includes areas with tighter subsoil, lighter color, or sandier surface soils, and some areas that are slightly alkaline. Three days spent in the field reviewing the soil classification map led to the impression that a number of small areas affected by alkali had not been excluded. The total area of these may be 1,000 to 2,000 acres in the Idaho division and perhaps 1,000 acres in the Oregon division. It is understood that drained land formerly waterlogged near Homedale and sagebrush land near Ontario is available to offset such exclusions as may be found desirable by a detailed survey. Any areas where greasewood forms a considerable portion of the native vegetation are undesirable. These objectionable areas are largely found in the vicinity of the Oregon-Idaho State line.

#### NONIRRIGABLE LANDS

Nonirrigable lands include all lands where the conditions with regard to topography, soil, drainage, or reaction are such that the land is not suited to continued crop production under irrigation. Slopes above 10 to 12 per cent are excluded. The soil types included in the project have been described in detail in previous reports. The areas of these classes of land are approximately as follows: Class 1, 62,819; class 2, 48,181.

#### DRAINAGE

It is difficult to estimate or foresee the future drainage requirement of an irrigation project. Based on the experience with similar irrigated lands adjacent and developed land within the Owyhee project, some need for drainage is anticipated to control seepage and to prevent accumulation of alkali in the lower areas. It is felt that at least \$10 an acre should be included in estimates and should be made available promptly to meet drainage needs as they arise. Drainage has been provided for about two-thirds of the area at present affected by seepage in the Gem district, and the condition there has been greatly improved. It can be expected that the new lands in this unit will require drainage following a few years of irrigation. Throughout the project low areas may come to require drainage outlets and some area of fairly level land having imperfect drainage in the subsoil due to compact or calcareous layers may be expected to require drainage following a general irrigation of new lands. The drainage condition on this unit has been covered in some detail in previous reports.

#### SOIL FERTILITY

Soil types grouped in the irrigable classes of land have been described in the report by Strahorn et al. Chemical analyses were included in the soils section of the Whistler report. These and subsequent studies show that the soil is a sedimentary material of volcanic origin. The average texture is of the order of very fine sandy loam, with a usable water capacity of about 1½ acre-inches per acre-foot and a soil depth of 30 to 60 inches. The chemical analyses indicate "excellent amounts of potash and of phosphorus." The supply of soil nitrogen and organic matter is fair for arid soil and tends to increase under irrigation where a crop rotation including legumes is employed.

Crop rotation is of first importance for maintaining good fertility and water capacity in irrigation farming. Growing beans in an irrigated rotation—namely, barley, clover, beans—at the Oregon Experiment Station for a 15-year period has built up the bean yield from 11.07 bushels to 36.66 bushels an acre, while with continuous cropping the yield declined to 4.85 bushels. The return per acre-inch was increased from \$3.02 to \$11.29 by the rotation, and with 10 tons manure added each rotation the return an acre-inch was increased to \$17.22.

The net profit per acre continuous cropping was \$9.06, with rotation, \$33.88; and with rotation and manure, \$51.66. The water requirement per pound dry matter was 3,579, 2,245, and 1,492, respectively, or was cut in two by rotation and manure. One-crop farmers all want water at once, whereas crop rotation permits distribution in time of use; rotation makes possible a diversity of crops with steady output; affords distribution of labor; helps eradicate weeds, avoid insect pests and plant diseases. Crop rotation is of primary importance in increasing the efficiency and net return per unit of irrigation water. Settlers should be urged and educated to practice modern crop rotation with one or more legumes included.

#### DUTY OF WATER

The duty of water delivery to farms for Owyhee project has been previously estimated at 3.22 acre-feet with such additional water as may be recovered for reuse. It is understood that this is based on use records of Boise project for the past decade. The committee feels that a duty of 3.5 acre-feet delivered to the farm unit will be needed, and estimates that with this quantity delivered, additional water may be recovered by drainage pumping and pluck up for reuse, if needed. In case it is ultimately found practicable to use less than the above amount some pumping may be discontinued or additional arid land included. It is believed that some of the water supply should ultimately come from drainage pumps.

Fortier<sup>1</sup> has recently summarized data from studies by Bark and others relative to water requirement, field-plat experiments, and use records for lower Snake Valley for staple crops. Alfalfa was found to have a net water requirement of about 7 inches per ton, or 2.45 feet for a 4-ton crop, adding 30 per cent for farm loss gives 3.19 feet required for farm delivery for this yield of alfalfa. Experiments on 108 alfalfa fields in southern Idaho used an average of 2.9 feet and produced an average of 4.37 tons. He concludes 2.75 feet is the economic duty. Cost increases directly with quantity used while yields are subject to the law of diminishing returns.

Wheat based on 41 water requirement trials was found to need 1.75 feet for a 35-bushel crop, and this was held to be a suitable amount.

Potatoes in southern Idaho trials used more than 1½ and less than 2¼ feet gave an average yield of 251 bushels.

Apples in 10 trials showed an average use of 2.20 feet including 0.42 foot effective rain.

Under good conditions the net water requirement in Oregon trials has been of the order of 6 inches per ton, alfalfa; 4 inches per 100 bushels, potatoes; and 2½ to 3 bushels wheat for 1 acre-inch. Gross use on pumping projects included in Owyhee project indicates a net use of from 3 to over 4 acre-feet.

An economic weighted duty for Owyhee project is estimated to be as follows:

#### *Weighted economic duty*

	Per cent of acre	Acre-inches an acre
Meadows, 5 tons by 7 inches or 35 inches, plus 30 per cent farm loss, 45.5 inches.....	0.60	27.3
Annals and orchards, 27 inches, plus 30 per cent, 35.1 inches.....	.40	14.0
Weighted acre-inches an acre.....		41.3

<sup>1</sup> Fortier, S., *Irrigation Requirements of the Arid and Semiarid Lands of the Columbia River Basin*, U. S. D. A. Tech. Bul. (In press.)

An ultimate economic weighted farm duty of 42 inches will, it is believed, be found adequate. Above this, other things will be the limiting factors—as fertility, skill, and economy of the irrigator, etc.

Fortier says: "Measured in money invested for the betterment of the irrigated farming, the difference between a field poorly prepared and one well prepared would not exceed on an average \$12 per acre. Interest on the cost of this permanent improvement would be less than \$1 a year, and at least six substantial benefits would be derived from it. These are (1) larger yields of crops, (2) better quality of crop, (3) reduction in waste of water, (4) saving time and labor in irrigating, (5) keeping the soil productive, and (6) enhancing the value of the farm."

#### WATER-SUPPLY STUDY OF OWYHEE PROJECT

*Source.*—The water supply for the irrigation of land in the Owyhee project is direct flow from Owyhee River and storage to be provided by the construction of the Owyhee Dam.

*Water rights.*—Water rights for the Owyhee project are based upon the following:

Appl- cation No.	Permit No.	Date priority	Quantity	Purpose
11708	R-509	{Feb. 14, 1916	100,000 acre-feet.....	}Irrigation, power, and domestic.
11709		{Aug. 19, 1924	600,000 acre-feet.....	
		{do.....	220,000 second-feet.....	
				Do.

*Prior right.*—The right to the use of water from Owyhee River and tributaries in Oregon has been adjudicated. The right to the use of water above the Owyhee Reservoir in Oregon, with the exception of the Jordan Valley irrigation district, will have no effect upon the quantity available for use in the Owyhee project. The right to the use of water from Owyhee River below the Owyhee Dam will have no effect upon the available supply, as practically all of the lands are to be served with water from the Owyhee Reservoir.

*Duck Valley project.*—There is a possibility of irrigating several thousand acres of land in the Duck Valley Indian Reservation, located in Nevada, with water diverted from Owyhee River near Owyhee, Nev., supplemented by storage.

The available records of Owyhee River near Owyhee, Nev., are as follows:

Year	Run off in acre-feet	Percentage of flow of Owyhee River at dam	Year	Run off in acre-feet	Percentage of flow of Owyhee River at dam
		<i>Per cent</i>			<i>Per cent</i>
1914.....	118,000	12	1924.....	39,600	14.4
1916.....	114,000	18.3	1925.....	96,000	15.8
1922.....	111,000	12	1926.....	30,100	7.4
1923.....	45,200	10.4			

It is assumed herein that for the irrigation of additional lands in Duck Valley and Jordan Valley irrigation district will deplete the flow of water in Owyhee River annually by an amount of 30,000 acre-feet.

*Records.*—Records of the flow of water in Owyhee River secured at a station located above its mouth, including the quantity diverted in the Owyhee ditch, is as follows:



Year ending September—	Run off, acre-feet	Remarks
1890.....	952,000	Mar. 26 to Sept. 30, inclusive. No records on canal.
1890-91.....	944,000	No records on canal.
1891-92.....	2,300,000	Do.
1892-93.....	1,520,000	Do.
1893-94.....	249,600	Three months records, October to December, 1923, inclusive.
1894-95.....		No records.
1895-96.....	701,000	
1896-1903.....	(0)	
1903-04.....	1,110,000	
1904-05.....	392,000	
1905-06.....	1,020,000	No records on canal.
1906-07.....	1,320,000	Do.
1907-08.....	1,345,000	Do.
1908-09.....	1,190,000	Do.
1909-10.....	1,260,000	Do.
1910-11.....	1,070,000	No records on canal. November and December, estimated.
1911-12.....	1,245,000	January, estimated.
1912-13.....	594,300	December, January, and February, estimated.
1913-14.....	974,800	December and January, estimated.
1914-15.....	315,900	December and February, partly estimated; January, estimated.
1915-16.....	859,300	December, February, and May, partly estimated; January, estimated.
1917-1919.....	(0)	
1920.....	169,700	Mar. 8 to September, 1920, inclusive, run-off appears to be above average
1921.....	939,900	Mar. 8 to Sept. 30, inclusive.
1921-22.....	919,800	1921. December, partly estimated; January and February, estimated.
1922-23.....	412,000	December, January, and February, partly estimated.
1923-24.....	274,000	December and February, partly estimated; January, estimated.
1924-25.....	605,200	
1925-26.....	407,800	January, partly estimated.
1926-27.....	857,200	October, December, partly estimated; January, estimated.
1927-28.....	864,300	Accuracy questioned.
1928-29 (May 11).....	482,500	Records cover months of October, November, February, 1928-1929. April, May (1-11); no records for December and January.

<sup>1</sup> No records.

*Duty of water.*—The following table shows the adapted use of water for the lands in the Owyhee project, exclusive of the Owyhee ditch. This use is the same as used in the Debler report.

Month	Delivery in per cent of annual	Delivery in acre-feet per acre	Canal loss in per cent at diversion	Diversion in acre-feet per acre
April.....	5	0.15	50	0.30
May.....	19	.62	30	.89
June.....	22	.70	28	.97
July.....	25	.80	25	1.07
August.....	20	.65	27	.90
September.....	8	.25	35	.38
October.....	1	.05	45	.09
November-March.....	100	(1)	100	.15
Total.....				4.75

<sup>1</sup> Stock water.

*Total water requirements.*—The following table shows the total quantity of water that will be required to meet the demands of the lands to be served in the Owyhee project, including the quantity that will be required to satisfy possible development in the Duck Valley project and Jordon Valley Irrigation district. This quantity is the same as used in Debler's study except for the upstream depletion.

Upstream depletion: 30,000 acre-feet annually distributed equally to April, May, and June.

Owyhee Ditch: 13,650 acres receives 3 acre-feet per acre direct flow and 21,000 acre-feet from storage.

Project land: 100,000 acres served by gravity with demand of 4.75-acre-feet per acre.

[Units, 1,000 acre-feet]

Month	Upstream depletion	Owyhee ditch	Project gravity lands	Total demands
November-March.....			15.0	15.0
April.....	10.0	4.0	30.0	44.0
May.....	10.0	12.0	89.0	111.0
June.....	10.0	13.1	97.0	120.1
July.....		14.4	107.0	121.4
August.....		12.2	90.0	102.2
September.....		5.1	38.0	43.1
October.....		1.2	9.0	10.2
Total.....	30.0	62.0	475.0	567.0

*Critical period.*—From the above it is evident that the critical period began with 1922.

*Area and capacity table*

Elevation	Area	Capacity	Elevation	Area	Capacity
2,590.....	5,620	10	2,640.....	9,600	381,835
2,600.....	6,616	60,680	2,650.....	10,613	482,900
2,610.....	7,289	129,700	2,660.....	11,672	594,325
2,620.....	8,024	206,265	2,670.....	12,750	716,000
2,630.....	8,745	290,110			

<sup>1</sup> Dead storage level.

<sup>2</sup> Top of storage.

*Estimated reserve losses (same as used by Deblor)*

	Evaporation in feet	Seepage in feet	Total		Evaporation in feet	Seepage in feet	Total
January.....	0.05	0.25	0.30	August.....	0.45		0.45
February.....	.10	.25	.35	September.....	.30		.30
March.....	.20	.25	.45	October.....	.25		.25
April.....	.30		.30	November.....	.15	0.25	.40
May.....	.40		.40	December.....	.10	.25	.35
June.....	.45		.45	Total.....	.325	1.25	4.50
July.....	.50		.50				

*Owyhee reservoir operation.*—A detailed study of the operation of the Owyhee reservoir from 1922 to 1929, inclusive, is shown in the following table:

*Owyhee Reservoir operation*

Year and month	Owyhee River flow, including Owyhee Ditch diversion	Diversion demands	Reservoir drafts	Reservoir losses	Reservoir draft, plus reservoir losses	Storage on hand at end of month
1922						
May.....						716.0
June.....	88.1	120.0	31.9	5.5	37.4	678.6
July.....	16.0	121.4	105.4	5.9	111.3	567.3
August.....	9.6	102.2	92.6	5.0	97.6	469.7
September.....	8.7	43.1	34.4	3.0	37.4	432.3
October.....	10.2	10.2	0	2.5	2.5	429.8
Total.....	132.6	396.9	264.3	21.9	286.2	

## Owyhee Reservoir operation—Continued

Year and month	Owyhee River flow, including Owyhee Ditch diversion	Diversion demands	Reservoir drafts	Reservoir losses	Reservoir draft, plus reservoir losses	Storage on hand at end of month
<b>1922-23</b>						
November-March.....	80.2	15.0	0	19.1	19.1	475.9
April.....	148.0	44.0	0	3.3	3.3	576.6
May.....	62.4	111.0	48.6	4.5	53.1	523.5
June.....	88.7	120.0	31.3	4.6	35.0	487.6
July.....	21.7	121.4	99.7	5.0	104.7	382.9
August.....	9.2	102.2	93.0	4.1	97.1	285.8
September.....	11.9	43.1	31.2	2.6	33.8	252.0
October.....	14.2	10.2	.....	2.2	2.1	253.9
Total.....	436.3	566.9	303.8	45.3	349.1	.....
<b>1923-24</b>						
November-March.....	138.4	15.0	0	16.5	16.5	360.8
April.....	67.7	44.0	0	2.8	2.8	391.7
May.....	25.9	111.0	85.1	3.7	88.8	292.9
June.....	10.0	120.0	110.0	3.7	113.7	179.2
July.....	6.4	121.4	115.0	3.5	118.5	60.7
August.....	5.6	102.2	96.6	2.5	99.1	0
September.....	6.2	43.1	36.9	1.0	38.8	0
October.....	4.6	10.2	5.6	2.0	7.6	0
Total.....	264.8	566.9	440.2	36.6	485.8	.....
<b>1924-25</b>						
November-March.....	299.5	15.0	.....	12.8	12.8	271.7
April.....	163.4	44.0	.....	3.1	3.1	388.0
May.....	82.1	111.0	28.9	3.8	32.7	355.3
June.....	29.6	120.0	90.4	4.0	94.4	260.9
July.....	8.9	121.4	112.5	3.7	116.2	144.7
August.....	2.0	102.2	93.2	3.0	96.2	48.5
September.....	8.0	43.1	35.1	2.7	37.3	11.2
October.....	13.5	10.2	.....	2.0	2.0	12.5
Total.....	614.0	566.9	360.1	34.6	394.7	.....
<b>1925-26</b>						
November-March.....	273.2	15.0	.....	13.0	13.0	257.7
April.....	69.4	44.0	.....	2.6	2.6	280.5
May.....	21.6	111.0	89.4	3.3	92.7	187.8
June.....	8.0	120.0	111.1	3.2	114.3	73.6
July.....	6.7	121.4	114.7	3.6	118.3	0
August.....	6.6	102.2	95.6	2.5	98.1	0
September.....	7.4	43.1	35.7	1.9	37.6	0
October.....	3.1	10.2	7.1	2.0	9.1	0
Total.....	396.9	566.9	453.6	32.1	485.7	.....
<b>1926-27</b>						
November-March.....	306.9	15.0	.....	12.8	12.8	279.1
April.....	284.6	44.0	.....	3.0	3.0	516.7
May.....	108.6	111.0	.....	4.5	4.5	569.8
June.....	61.8	120.0	58.2	5.0	63.2	506.6
July.....	12.8	121.4	108.6	5.0	113.6	393.0
August.....	10.0	102.2	92.2	4.1	96.3	296.7
September.....	12.1	43.1	31.0	2.6	33.6	263.1
October.....	27.0	10.2	.....	2.2	2.2	277.7
Total.....	883.8	566.9	290.0	39.2	329.2	.....
<b>1927-28</b>						
November-March.....	576.3	15.0	.....	.....	.....	716.0
April.....	131.4	44.0	.....	4.0	4.0	716.0
May.....	89.0	111.0	22.0	5.1	27.1	688.9
June.....	17.2	120.0	102.8	5.4	108.2	580.7
July.....	8.1	121.4	113.3	5.5	118.8	461.9
August.....	7.1	102.2	95.1	5.0	100.1	361.8
September.....	8.6	43.1	34.5	2.7	37.2	324.6
October.....	3.2	10.2	7.0	2.3	9.3	315.3
Total.....	840.9	566.9	374.7	30.0	404.7	.....
<b>1928-29</b>						
November-December.....	231.0	15.0	.....	.....	18.0	513.3
April.....	192.3	44.0	.....	.....	3.4	658.2
May.....	56.0	111.0	.....	.....	.....	.....
June.....	.....	120.0	.....	.....	.....	.....
July.....	.....	121.4	.....	.....	.....	.....
August.....	.....	102.2	.....	.....	.....	.....
September.....	.....	43.1	.....	.....	.....	.....
October.....	.....	10.2	.....	.....	.....	.....

If 1928 records are reliable there would be no shortage in 1929

† Records from May 1 to 11, inclusive.

The records show that the Owyhee Ditch Co. would in each year receive the quantity of water in acre-feet decreed to it, which would result in the shortages being charged to the project lands. The shortages as shown by the table of reservoir operations charged against the project lands are as follows:

Year	Shortage in per cent of average diversion demand	Probable shortage in delivery to farms
1924.....	18	25
1926.....	40	60

The serious shortage which occurred in 1926 was due to the dry cycle which began in 1923 and extended to and included 1926. The records of the flow of streams in the northwest do not disclose a similar cycle and the recurrence of a similar dry cycle is not probable.

During the period of 1890 to 1928 for which run-off records are available, some shortage would have occurred in not more than three additional years. It is evident from the records that these shortages would have been much less than that of 1926 and that comparatively the water supply will be superior to that of most similar projects in the northwest.

#### *Estimated cost of project*

Owyhee ditch, 12,000 acres.....	\$300,000
Lands now under pump, 41,000 acres, at \$150 per acre.....	6,150,000
Lands now dry, 70,000 acres, at \$165 per acre.....	11,550,000
Total.....	18,000,000

The project, it will be noted, has been reduced since the previous report from a total area of 139,500 acres to 123,000 acres. These reductions are a result of more detailed land classification. There may still be modifications in the project plan which would effect changes in the estimated costs.

#### ECONOMIC FACTORS

It was rather difficult to get accurate information on the amount of bonded and mortgaged indebtedness in the locality. The county records were not in a shape to furnish this information without considerable work. County officials were unable to give the time necessary to compile the data desired, and the committee had no one they could assign to it. In the improved area the number of mortgaged farms was variously estimated by bankers and others to be from 60 to 75 per cent of all farms. It was estimated that about 60 per cent of the farmers' total indebtedness was in long-time loans, 10 years or more, 10 per cent in intermediate loans, varying from 1 to 3 years, and 30 per cent in short-time indebtedness, such as short-time notes, store bills, and other small obligations.

A statement from the Federal Land Bank of Spokane, Wash., on loans made to farmers within the different pumping districts shows 86 loans made and 8 foreclosures. The amount of the loans varied from \$25 to \$100 per acre. The indebtedness carried by the irrigation districts is shown by the table giving their per acre indebtedness and assessments.

*Per acre indebtedness and assessments of irrigation districts, 1928*

District	Indebtedness		Assessment		Remarks
	Fixed	Current	Operation and maintenance	Other	
Kingman Colony.....	\$3. 41	\$1. 10	{ \$5. 10 5. 76 7. 55 8. 21	-----	Rate of assessment depends on lift.
Short Line.....		1. 50	10. 00	-----	
Ontario-Nyssa.....		1. 00	8. 50	-----	
Advancement.....			8. 75	-----	
Payette-Oregon slope.....	49. 00	5. 18	7. 00	\$3. 50	Bonds, \$262,000. Guarantee interest by State of Oregon, \$16,500. All classes as fixed indebtedness bases on 5600 A.
Crystal.....	21. 00		6. 00	1. 50	
Snake River.....	21. 00	3. 58	8. 74	1. 28	Has not operated for 3 years. Indebtedness figured as of \$1,000,000 on 27,234 acres.
Slide.....	84. 00	75. 00			
Gem.....	63. 33		7. 50		
Owyhee Ditch Co.....	5. 00		2. 20		Owyhee Ditch Co. is based on \$5 per acre for 10,000 acres.

Regarding conditions in the county with respect to mortgage foreclosures, an attorney in Malheur County for the State land board and the World War veterans' State-aid commission states that just prior to 1925, due to the general agricultural situations and a large number of bank failures, farming conditions were very much depressed, and that during the period from 1921 to 1925 there were a large number of foreclosures in this county by the State land board and by the Federal reserve bank and by a number of insurance companies which had large sums loaned, particularly the Union Central Life Co., of Cincinnati. But about 1925 and 1926, he states, the poor loans were pretty well foreclosed, and since that time the foreclosures have been growing gradually less and less. He was of the opinion that this statement was true of all the companies or organizations which have money loaned in the county. Within the past year, he says, foreclosures have been very rare as compared to former years, partly due no doubt to the fact that farming conditions generally have improved and crops throughout the Snake River Valley have been consistently good.

Farmers, business men, and county officials are all of the opinion that the agricultural and economic conditions have improved very much since the feasibility report was made in 1925. As evidence of this fact the bankers point to their increased bank deposits. The merchants claim collections are easier and bills more promptly paid, while the county officials state their delinquencies are less. On the other hand, an official of the Federal land bank states he has seen very little change since 1925.

## TAXES

General taxes are not any higher than are found in other irrigated sections of the State. They will generally range from \$2 to \$3 per acre. The thing that is the most irksome and the greatest worry to farmers is the high cost of water. Water charges per acre run from \$2.20 on the land served by gravity to \$10.50 an acre on the land under the pumping districts. Many farmers state that under present water charges failure is inevitable and are wondering if they can hold on until relief comes as a result of the Government building the project. There can be no question but what the farmer's burden under the pumping plants is heavier than he can bear and that he is gradually breaking under it. This is evident from his own story and is also reflected in the appearance of the farmsteads and the increasing number of tenants. Relief for the farmers under the pumping plants at the earliest possible date is of the most urgent need.

## CREDIT

Local credit, according to the banks, is sufficient to take care of the short-time loans. The Federal land bank has loaned in Malheur County \$711,050, but is making few or no new loans due to local conditions. The intermediate credit bank is loaning, through the Farmers' Cooperative Creamery, \$150,000 on dairy cattle at 7 per cent. The local interest rate is 8 to 10 per cent on short-time paper. It is not a general practice of the local banks to make loans for permanent improvements. There is need for more credit amortized on a long-time basis.

## SETTLEMENT

The prompt settlement of the project is an important factor to its success. Most of the factors that should make settlement attractive, such as climate, good soil, established communities, good highways, and railway transportation, are all found on the Owyhee project. Much of the land has been farmed long enough to demonstrate its ability to produce as well as the type of agriculture for which it is best adapted. It is estimated that approximately 1,000 settlers will be needed to settle the 70,000 acres of new land that will be opened for settlement. The size of the farm units will range from 40 to 80 acres, with 80 acres as the more desirable unit and offering better chances for success.

To settle 70,000 acres of land under present conditions is an entirely different task than it was 20 years ago. The willingness of those who might be interested in developing a new farm under pioneer conditions and to endure hardships is not as great now as in the homestead days. For this reason the opportunities to succeed under more favorable conditions must be made attractive. It is important that settlers should be carefully selected with reference to experience, capital, and other desirable characteristics. Not to do this would court trouble and failure.

A settler should be properly financed and have had several years of farming experience, preferably under irrigation. It is appreciated to determine just who are going to succeed, and how much capital and experience each should have is not an easy matter, but it is very evident from past experience that those who have had experience and capital have made the most rapid and greatest progress. With reference to the capital a settler should have, the committee feels \$5,000 in cash or its equivalent in livestock and equipment. This is little enough and his chances for success would be much better if he had more. To develop a farm to the stage of full production will require from \$10,000 to \$12,000. The day has passed when farmers are willing or should be asked to be satisfied with a low standard of living. The American standard of living on the farm should be equal to that in the city; to make it less so means to make it undesirable and unattractive.

The seeming high cost of water and the availability of improved land at competing prices in neighboring sections will have their effect on the settlement of the project. These factors make it necessary, if reasonably prompt settlement is to be expected, that the opportunities for success be made as attractive as possible. While construction cost is high, it is offset by low-priced land and interest-free money over a long period of time. No large down payments will have to be met, which is another inducement to settlers.

## LAND APPRAISAL

The appraisal of all the new lands and the provision in the contract requiring landowners to sell at appraised prices, and that on resale one-half of the increase in price shall go to the Government to apply on construction costs is one of the best features ever written into a reclamation contract. If such a procedure had been followed on other projects many of their financial problems which developed following construction would have largely been eliminated. The appraisal feature of the Owyhee contract reduces to a minimum land speculation and the disposal of lands in the strictest accord with it can not be recommended too strongly.

## COOPERATION OF STATE AGENCIES

The Oregon State Chamber of Commerce, local commercial clubs, and local organizations are all interested in the successful development of the Owyhee and Vale projects and assure their cooperation in the settlement of these pro-

jects. All report an increasing interest on the part of the prospective settlers in the Vale and Owyhee lands.

As indicative of the interest in settlement, a report of the progress being made in settling the Vale project, which is in the same locality as the Owyhee and will be opened next spring, is herewith submitted:

*Vale project settlement report, July, 1929*

	Acres
Area to be settled.....	4, 012
Public land not entered.....	824
Public land entered.....	504
Private land sold.....	977
Private land to be improved by owners.....	271
Private land for sale.....	1, 436

A summary of the land settlement department of the Oregon State Chamber of Commerce is also submitted showing its activities since July, 1923, to date, and its activities for the past 18 months.

*Summary of entire campaign beginning July 1, 1923-July 1, 1929*

Total families located.....	3, 815
Total investment.....	\$16, 089, 958. 50
Total acreage purchased.....	131, 933
Total cost.....	\$105, 000. 00
Average cost per family.....	\$30. 00
Total inquiries received.....	99, 837
Total pieces of literature sent out.....	270, 901
Total letters mailed out.....	203, 571

*Report for past 18 months, ending July 1, 1929*

Number of inquiries received.....	20, 752
Signed questionnaires returned.....	1, 257
Number stating they were coming to Oregon to locate.....	1, 109
With specified capital investment of.....	\$3, 015, 873. 00
Letters mailed out.....	56, 078
Pieces of literature mailed out.....	43, 690
Callers at office.....	5, 561
New settlers reported.....	693
Investment.....	\$3, 246, 041. 50
Acreage.....	145, 009

Land sales in the Gem irrigation district indicate also a movement in land. Out of 8,000 acres for sale, 7,000 acres of it have been sold. The price has ranged from \$2.50 per acre to \$50 per acre, 25 per cent down and balance in installments beginning two years from date of sale, with interest on deferred payments of 6 per cent.

AGRICULTURAL ADVISERS

Agricultural advisers are needed to assist the settlers and should be provided. Settlers need assistance at the start more than at any other time in working out their farming systems. This is one of the oldest factors in the success of any settler. To be left to guess what is best to do is not fair to him and certainly depreciates the security in both the settlers' and the Government's investment.

CLIMATE

The United States Department of Agriculture Weather Bureau records at Kingman, which is a few miles southeast of the center of the Owyhee project in the Kingman division at an elevation of 2,200 feet, indicate that the average annual precipitation is 8 or 10 inches, about one-third of which occurs during the growing season. The 12-year average annual mean temperature there is 51.7°, with extreme temperature ranging from 108° above (July 20, 1928) to 35 below zero (December 25, 1924).



The average growing season between killing frosts is about 140 to 160 days, depending somewhat upon location.

Prevailing winds are northerly, varying in degree toward the east and west with location. Wind velocity is moderate.

#### LAND UTILIZATION

It is assumed that about 10 per cent of the land will be used for purposes other than the productive crop area. The nonproductive area reported as irrigated in the Wilder unit of the Boise project, where conditions appear quite similar to what may be expected on the class 1 lands of the Owyhee project, averaged about 9 per cent during the 3-year period, 1926-1928.

It is also assumed that about 5 per cent of the land will be used for fruits, vegetables, and specialty crops. The most important fruits are apples and prunes. The success of the project depends not upon the comparatively small area which will be utilized by specialists, however successful they may be, but upon the profitable utilization of the remaining 85 per cent of the land.

*Utilization of lands in Wilder district.*—Crop census data from the Wilder unit of the Boise project indicate that about 91 per cent of the grand total of irrigated land was in productive crops as an average for the period 1926 to 1928.

Of the productively cropped land, approximately 37.7 per cent was in alfalfa, about 8 per cent in clover for hay and seed, about 8.3 per cent in pasture, 8 per cent in corn, 25.3 per cent in wheat, 5.3 per cent in barley, 1.8 per cent in oats and rye, 2.4 per cent in potatoes, 2.5 per cent in tree fruits, and less than 1 per cent in vegetables and small fruits.

*Best crops for Owyhee lands.*—The crops that are likely to be most profitable for general farming and livestock husbandry on the Owyhee project are alfalfa, pasture, red clover, wheat and corn. Potatoes will be profitable for a few farmers who know how to handle the crop on a conservative basis. A small acreage of barley and some oats may be grown, but these crops will generally be less profitable than wheat except under special circumstances.

About 60 to 65 per cent of the irrigated area, or 70 to 75 per cent of the land utilized for general farming, should be in alfalfa, clover, and pasture. Wheat, corn, and potatoes should be produced only in rotation with these crops, as the soil is not capable of sustained production of nonlegumes. On this point we quote from the report of the local committee Owyhee project made in 1925: "Three acres of hay and forage crops to one acre of cash or speculative crops. We feel that this is about the proportion proper for this section, as it has worked out satisfactorily under the present ditches."

Comparative returns per acre for these crops on good lands, above cash costs, allowing 30 cents an hour for man labor, are estimated in the annual report of the county agent at Malheur County, based on about 300 farm records taken over a period of five years, and other data, made in 1925 as follows: Alfalfa, \$9; clover hay and seed, \$27.15; pasture, \$10.50; corn, \$3; wheat, \$1.75; barley, minus \$10.25; oats, minus \$13.25; and potatoes, \$39.

Crop and price conditions have changed slightly since 1925, but these figures are indicative of the best paying crops. Further information is contained in the following table which indicates that barley, oats, and rye return relatively low income per acre compared to wheat, which costs about the same to produce. These results also favor wheat compared to corn as a cash crop.

*Three-year average acre yields and values, Wilder district, Boise project, 1926-1928*

Crop	Yield	Unit value	Acre value
Alfalfa hay.....	tons..... 3.30	\$8.01	\$34.53
Clover hay.....	do..... 1.56	7.81	12.22
Clover seed.....	.....bushels 3.80	13.59	49.76
Pasture.....	.....bushels 12.85		17.37
Wheat.....	.....bushels 33.57	.974	32.60
Indian corn.....	do..... 31.71	.86	26.77
Potatoes.....	do..... 191	.53	102.28
Barley.....	do..... 35.04	.628	22.32
Oats.....	do..... 3.924	.549	21.85
Rye.....	do..... 33.06	.65	13.71

*Probable crop yields on Owyhee project.*—Assuming an average weighted delivery of 3.5 acre-feet to the farms developed, class 1 lands in soil-building crop rotations should produce average yields as follows: Alfalfa hay, 4.5 tons; pasture for 2 cows or 8 sheep, six months, red-clover seed, 4 bushels; wheat, 40 bushels; corn, 50 bushels; and potatoes, 125 hundredweight. Should the project be developed on the basis of 3.22 acre-feet delivered to the land, and should the average water shortage equal the average shortage of the past six years, crop yields would average 15 to 20 per cent less. Second-class land, because of topography and soil conditions, are adapted to a narrower range of crops and are estimated to produce an average of about 25 per cent less than class 1 lands, except corn and alfalfa, which would be 5 to 25 per cent less.

*Alfalfa yields on Boise project.*—The average yield of alfalfa hay on the Boise project during the 12-year period—1915 to 1926—was 3.0 tons. An average of 3.23 acre-feet of irrigation water was delivered to the farms from project works, and the average precipitation at Boise was 1.11 acre-feet, making a total of 4.34 acre-feet of surface-applied water, not including any water which may have been available from other sources. These results, together with those obtained on the Wilder unit of the Boise project, substantiate the above estimates of probable yields on the Owyhee project in greater degree than crop reports obtained from the present developed lands in the project.

*Malheur County crop yields.*—Some estimates of average crop yields in Malheur County are reported annually by the State statistician, but these data are not applicable because they are taken to represent the whole county, much of which differs very materially with respect to soil, elevation, and water supply. The county agricultural agent obtained data from 1920–1925 from irrigated farms along the Snake River. The following is quoted from the 1925 annual report:

In the light of statistical information secured from lands in actual cultivation over a period of six years, having due regard for the improvements which have been effected or are being realized along crop-production lines, and remembering but without calculating the possibilities for greater improvements in the future, the following is set out as reasonable yield expectations for the crops which should be grown on the better lands along the Snake River in the light of present information:

Table I.—Reasonable average acre yield expectation from crops

Alfalfa hay.....	tons.....	5
Clover hay.....	do.....	1½
Clover seed.....	bushels.....	5
Corn.....	do.....	50
Wheat.....	do.....	40
Barley.....	do.....	40
Oats.....	do.....	50
Potatoes.....	hundredweight.....	125
Fruit.....	car.....	⅓

Pasture, 2 to 3 cattle or 8 to 10 sheep.

It should be said, however, that these lands undoubtedly have received more irrigation water than those of the Boise project. The 1925 report on the Owyhee project indicates an average of about 4.55 acre-feet gross for the pump lands, not including the Owyhee Ditch Co. With respect to red clover, it is necessary to say that some pests have appeared which may make it necessary to keep the stand for one year only instead of two years as formerly practiced, which will likely reduce the average annual yield.

*Gross returns per acre.*—In the 1925 report average gross crop returns from the Owyhee project were estimated at \$40, with class 1 lands yielding around \$45 and class 2 lands around \$35. With an average weighted delivery of 3.5 acre-feet to the farms and provision for increasing this if needed, it seems probable that this average income may be realized.

This is somewhat higher than is being obtained on the Boise project, or from the Wilder unit of that project, but on the other hand some improvement in crop practices is possible there. Such results are not likely to result, however, unless very good farming is done.

*Gross crop returns on Boise project and Wilder unit.*—The weighted average value of crop production on the Wilder unit of the Boise project for the

3-year period 1926-1928 was \$34.42. In 1928 it was \$36.03, compared to an average of \$33.08 for the entire Boise project.

The weighted average value per acre of crop production on the productive area, Wilder district of the Boise project, for the years 1919 to 1928, inclusive, was \$40.76. The gross value of crops produced during the 8-year period was \$13,189,230.77 from a gross acreage of 323,592.05 acres, or an average of 40,445.26 acres of productively cropped land a year.

*Summary of crop census results, Boise project, Wilder district*

Year	Acreage	Total value	Value per acre
1919.....	41,100.24	\$3,073,900.77	\$74.79
1920.....	50,841.08	2,372,892.10	46.67
1921.....	7,741.24	207,917.04	26.86
1924.....	41,642.67	1,295,331.65	31.10
1925.....	46,166.82	1,553,972.21	33.66
1926.....	41,639.00	1,134,965.00	27.26
1927.....	46,378.00	1,817,763.00	39.19
1928.....	48,083.00	1,732,399.00	36.03
Total.....	323,592.05	13,189,230.77	-----

#### LIVESTOCK

Dairying must be the principal livestock enterprise, with some farm flocks or sheep, some hogs, and poultry. Class 2 lands should be devoted almost exclusively to dairying, as, because of topography, they are not suitable for general farming in crop rotation with annual crops like clover and wheat. Difficulty will be experienced in securing stands of such crops, and the yields will be relatively lower than of alfalfa and corn.

Sheep are suitable livestock to combine with cash crop farming on class 1 lands where the farmers will prefer to grow less alfalfa and more clover, wheat, corn, and potatoes. The topography of the class 1 lands is generally favorable for the production of such cash crops in rotations. It is essential that the project be developed without greatly increasing the supply of alfalfa for cash sale, as there is generally a surplus on hand above the needs for wintering range sheep and cattle in this area. This means that dairying must be expanded rapidly, as the new lands, especially the class 2 lands, are brought into cultivation. From the standpoint of maintaining fertility and balancing up the labor requirement of the farm, livestock are important also.

*Livestock on the Boise project.*—Some idea of the relative importance of the different kinds of livestock which will probably be kept on the Owyhee project farms may be gained from livestock census data from the Boise project, where at the close of 1928 there were 17,938 dairy cattle, 1,408 other cattle, 20,396 sheep, 23,313 hogs, 7,558 horses, and 204 mules. The number of fowls was 215,174 and 1,856 hives of bees were reported. (Payette figures.)

The trend on this project is to increase the dairy industry, particularly on the lower grade lands and on lands where good pastures can be produced. Except on the best lands, cash crops are becoming less important. Car-lot shipments from Caldwell, which is in the center of the Boise project, show substantial decreases in wheat and potatoes and steady increase in dairy and poultry products during the years 1925, 1926, 1927, and 1928.

*Creamery growth.*—Growth of the dairy industry in this section is shown by records of the cooperative creameries at Payette and Caldwell. The Payette institution manufactured 200,440 pounds of butter in 1916, 656,146 pounds in 1920, 2,539,639 pounds in 1925, and 3,815,920 pounds in 1928. The Caldwell organization doubled its volume of business from 1926 to 1928, selling \$1,27,748.06 worth of butter, \$31,831.53 worth of ice cream, and \$15,804.52 worth of buttermilk powder in 1928.

*Farm organization.*—The permanent settlement and development of the Owyhee project depends in the last analysis upon the opportunity afforded there for farmers to support their families as well or better than they are able to do elsewhere. To make a forecast of the probable amount of money available for family expenses, after the operating and overhead expenses of the farm are paid, is always a difficult and painstaking task, even in a de-

veloped community where the number of indefinite factors are fewer than in this instance. Treatment of this question should begin with consideration of the standard of living on the farms.

*Farm-living standards.*—Numerous studies and reports on the amount of money needed by farm families for family expenses in addition to what is obtained from the farm have been made in recent years. A review of these data indicate that an average of about \$1,200 in cash is necessary to maintain the average farm family on a modest standard.

Food .....	\$250	Recreation and social .....	\$100
Clothing .....	300	Miscellaneous .....	50
Household .....	200		
Health and insurance .....	200		1,200
Education .....	100		

In addition, the family should eventually be housed in a desirable dwelling, worth probably about \$3,000. During the developing period, however, a more modest building could be used. Products from the garden and farm worth \$300 a year would be used.

*The farm business.*—With the foregoing estimates of probable yields on the different kinds of land—which, it must be said, are uncertain because the water supply at the farm for irrigating the crops as well as other factors that influence yields are not definitely known—it becomes necessary next to estimate the probable average unit prices of the principal products to be sold from the farms.

*Unit values.*—In estimating the probable average unit value of the principal crops and livestock adapted to the Owyhee project, it is recognized that most of this land will not come into production for many years, and that the Government will not have recovered construction costs until toward the close of the present century. All that can be done is to give consideration to past and present values and to such information as may be available for judging future trends. Lack of time has limited these considerations. The committee submits the following estimates for what they may be worth:

#### Unit crop values

Alfalfa hay .....	ton	\$8.00
Clover seed, red .....	bushel	12.50
Corn .....	do	.87½
Wheat .....	do	1.00
Barley .....	do	.70
Potatoes .....	hundredweight	1.00

Pasture, dairy cow, \$2; ewe and lamb, 50 cents a month.

*Gross crop values.*—Multiplying the average crop yield for each class of land by the average unit value gives the estimated gross value.

#### Class 1 land

Crop	Yield	Unit value	Gross value per acre
Alfalfa hay .....	4.5 tons .....	\$8.00	\$36.00
Clover seed .....	4 bushels .....	12.50	50.00
Corn .....	50 bushels .....	.87½	43.75
Wheat .....	40 bushels .....	1.00	40.00
Barley .....	40 bushels .....	.70	28.00
Potatoes .....	125 bushels .....	1.00	125.00

Pasture, 2 cows or 8 sheep, 6 months, \$2 or 50 cents, \$24.

It should be said that variations in gross income per acre are certain to occur not only from year to year but also between the various grades and conditions of the classes of land and between farms according to the experience, ability, and financial situation of the operators. It is impossible to state definitely what the future trend of average prices may be or even to say whether average crop yields will increase or decrease.

*Livestock values.*—Dairy cows and sheep are estimated to yield products which will sell as listed below. Records of the Payette Cooperative Creamery indicate a present average of about 200 pounds of butterfat per cow, but good dairymen will obtain a higher average.

Kind	Product	Unit value	Gross
Dairy cow.....	250 pounds butterfat.....	Cents 42½	\$112.50
Ewe.....	80 pounds lamb, 8 pounds wool.....	10, 25	10.00
Pork.....		8	

*Costs and expenses.*—In estimating probable costs and expenses in crop production and operation of the farm business it is necessary again to anticipate future prices and situations. The following estimates are as good as the committee is able to make in the very short time allotted to it:

*Operating costs and expenses per acre of crops*

Crop	Man-hours	Horse-hours	Machine expenses	Seed	Materials	Insurance and storage
Alfalfa hay.....	37	33	\$2.50	\$0.50	.....	\$0.50
Clover seed.....	35	30	10.00	2.50	\$1.00	.60
Pasture.....	7	3	.25	2.00	.25	.....
Corn.....	50	57	3.00	.50	.50	1.00
Wheat.....	30	45	7.00	2.00	3.50	1.00
Potatoes.....	80	87	4.00	16.00	19.00	.50

*Farm overhead expense.*—It is difficult to estimate the probable cost of farm overhead, but based on such data as the committee has secured it appears that taxes may be from \$2 to \$3 an acre, with an average of about \$2.50.

Annual assessments by the irrigation districts for operation and maintenance are estimated at \$1.50 to \$2, to which will be added the assessments for repayment to the Government for construction of the project.

On the 40-year repayment plan assessments to repay construction will probably be not less than \$5 an acre and may exceed that amount if much of the land is not profitably utilized. It is assumed that total water assessments under this plan will therefore be about \$7.50 an acre.

Should the crop repayment plan be adopted as recommended in the 1925 report, total annual assessments might be about \$4 an acre, unless development was slow. This is not so likely to happen if 5 per cent of the gross crop value is paid toward construction as under the 40-year plan.

*Farm set-ups.*—The two farm set-ups which follow are intended to illustrate a way for organizing a farm on each of the two main classes of soil. It is believed that class 1 soils are better adapted to cash crops; therefore, a cash-crop farm with sheep is taken as the type of a farm which a high-class farmer reasonably financed could operate.

Class 2 lands are not so well adapted to crop production, therefore it is important that livestock enterprises be engaged in more extensively. Dairying is the most promising livestock enterprise for extensive development; accordingly, this farm is organized as a dairy farm such as could be operated by a good dairyman with a reasonable amount of his own capital.

It is recognized that some specialists will be able to handle selected land so as to secure more income. On the other hand, less than average quality lands in the hands of inexperienced, underfinanced, or incompetent farmers will not do so well.

It is further realized that in practice there will develop a wide variety of farm set-ups, according to the particular conditions each operator must meet. The number of undesirable set-ups may be reduced through effective educational service.

*Cash crop and sheep farm, class 1 lands.*—This set-up is suitable for a farm on class 1 lands of good topography, suitable for the irrigation of red clover for seed, potatoes, and other crops requiring careful handling. It is assumed

that average yields of all crops will be obtained which would require that the farm be operated by a high-class man capable of mastering the details of producing and marketing several commodities.

Since the cash market for alfalfa is already supplied, and it is not good husbandry to sell hay off of the farm, only enough alfalfa is to be grown to supply livestock needs on the farm. Sufficient pasture to handle the livestock most economically during summer is provided. The rest of the farm land will be in a cash-crop rotation. The alfalfa and pasture should be placed on the land most difficult to irrigate, so that the potatoes, clover, and wheat may have the most careful treatment possible.

*General set-up.*—Family of five, able to supply farm labor equivalent to one and one-half able-bodied men.

Farm of 80 acres of class 1 land.

Owner has \$5,000 in capital and household and personal goods.

Cost of land, clearing, leveling, ditching, fencing, domestic water supply, farm buildings, and dwelling	\$8,000
Livestock	1,500
Machinery and equipment	1,000
	<hr/> 10,500

#### Livestock

Bucks	3	Horses	3
Chickens	50	Ewes	100

#### Crops

Acres out for buildings, yards, ditches, roads, etc.	8
Acres of permanent pasture (2 animal units per acre)	10
Acres of alfalfa, average yield 4.5 tons	6
Acres early potatoes, average yield 125 hundredweight	14
Acres of wheat, average yield 40 bushels	14
Acres of red clover for seed, average yield 4 bushels	28

(Rotation, potatoes, clover, wheat, clover.)

Sheep to receive pasture, cull potatoes, etc., in summer; hay and other roughage in winter, some grain at lambing time. Horses—pasture, alfalfa hay, and some grain. Necessary to buy a little minerals, etc.

#### Budget

<b>Expense:</b>	
Family	\$1,200.00
Hired labor	600.00
Feed	100.00
Taxes	200.00
Machine expense	450.00
Seed	350.00
Sacks and materials	350.00
Interest, long-time, \$5,500, at 7 per cent	385.00
Interest, short-time, \$750, at 8 per cent	60.00
Irrigation, operation, and maintenance	160.00
Miscellaneous farm expense	250.00
	<hr/> 4,105.00
<b>Income:</b>	
Lambs and wool	1,000.00
Potatoes, 1,750 hundredweight, at \$1	1,750.00
Wheat, 560 bushels, at \$1	560.00
Clover seed, 112 bushels, at \$12.50	1,400.00
	<hr/> 4,760.00

NOTE.—This farm would have \$655 to apply on interest on owner's capital, repayment of irrigation construction, repairs to buildings, farm improvements, increasing living standard, etc.

*Dairy farm, class 2 land*

It is assumed that the average yield of alfalfa, corn, and pasture on class 2 land will be 15 per cent less than class 1 lands; that wheat would yield 25 per cent less and therefore would not be profitable; and that potatoes and clover are impractical because of topography. The lack of a cash market for increased supplies of alfalfa makes it necessary to consider the dairy industry as an outlet for the alfalfa. Pasture and corn will be needed as supplemental feeds.

While cost of production studies made by the Oregon Experiment Station indicate that it will cost \$1 more a ton to produce alfalfa when yields average 3.75 tons than with average yields of 4.5 tons, the cost of moving hay together with the inconvenience and uncertainty in securing supplies of suitable quality makes it desirable to produce all of the hay on the dairy farm. Sufficient pasture should also be maintained. More elasticity in corn production is possible as good grain can always be bought or sold. There is some question about the economy of producing silage, therefore it is suggested that some roots like carrots be grown to be fed during the winter.

*General set-up*

Family of five, able to supply farm labor equivalent to one and one-half able-bodied men.

Farm of 80 acres of class 2 land, account of topography. Owner has \$5,000 in capital, and household and personal goods.

Cost of land, clearing, leveling, ditching, fencing, domestic water supply,	
farm buildings and dwelling.....	\$8,000
Livestock.....	3,500
Machinery and equipment.....	1,000
	<hr/>
	12,500

*Livestock*

Milk cows, average production 250 pounds butterfat.....	25
Yearling heifers.....	5
Calves for replacement.....	5
Bull.....	1
Horses.....	3
Sows.....	3
Chickens.....	100

(About 35 animal units in hay and pasture requirements.)

*Crops*

Acres out for buildings, yards, ditches, roads, etc.....	8
Acres of permanent pasture, carrying capacity 1.7 animal units per acre for 6 months.....	20
Acres of alfalfa, average yield 3.75 tons, 145 tons.....	39
Acres of corn, 425 bushels, 10½ tons.....	9
Acres of carrots, 15 tons, 60 tons.....	4

(Rotation—alfalfa, 6 years; corn and carrots, 1 year; corn, 1 year; fields, 6½ acres.)

Livestock on pasture to receive 15 pounds of hay a day per animal unit, carrots. Young stock and horses, 15 to 20 pounds of hay in winter. Hogs to be fed at a rate of 4 pounds of skim milk to 1 pound of grain and have some pasture and hay. Some mineral and concentrates for all livestock as needed, which would be about all the feed necessary to buy.



*Budget*

<b>Expense:</b>	
Family .....	\$1, 200. 00
Hired labor .....	600. 00
Feed, concentrates, etc. ....	200. 00
Taxes .....	200. 00
Machine expense .....	300. 00
Seed .....	50. 00
Interest, \$7,500 at 7 per cent .....	525. 00
Irrigation, operation and maintenance .....	160. 00
Miscellaneous farm expense .....	250. 00
	<hr/>
	3, 485. 00
<b>Income:</b>	
6,250 pounds of butterfat, at 42½ cents .....	2, 656. 25
4,375 pounds of pork, at 8 cents .....	350. 00
Cull cows and veal .....	400. 00
Poultry .....	50. 00
	<hr/>
	3, 456. 25

**NOTE.**—Repayment of construction of irrigation works, interest on operators' capital, and repairs and depreciation of buildings not provided for. In order to meet construction charges, it will be necessary for the operator to do more of his own work, pay less interest, or reduce his living costs. It is apparent from this set-up that it would be very difficult for the farmer on second-class land to meet construction charges under the 40-year contract; however, he should be able to pay 5 per cent on an estimated \$35 crop value, or \$140 per year on an 80-acre farm.

**Marketing.**—The marketing problems of the dairymen are already well taken care of by two large cooperative creameries. These institutions are among the most efficient in the country and return high prices to their members for sweet cream for manufacturing butter and ice cream. Cooperative associations also serve the territory for handling eggs and poultry. Hogs are readily sold for shipment to Pacific coast markets. There is a local demand for all of the corn that is likely to be grown for cash sale. Local mills and other facilities are always ready to buy wheat. There is nearly always a good cash demand for clover seed.

Growers of alfalfa hay for cash sale frequently have difficulty in disposing of all of it. Marketing of this crop depends largely upon the development of the farm-livestock industry. Potato growers frequently have difficulty in marketing their crops and sometimes are unable to secure prices high enough to pay harvesting costs. On the other hand, there is a good demand at profitable prices in other years, so that on the average the crop is profitable to the few who have suitable land and continue year after year on a conservative basis. The cash market for barley and oats is not usually very good at harvest time, but tends to improve during the winter and spring unless production exceeds local demand.

The Pacific coast region is developing more rapidly than the whole country and demand for food products in the West is increasing. This will improve the market situation for the Owyhee project, particularly if a shorter railroad is built to the California markets and more favorable facilities become available for reaching Portland and other Pacific Northwest cities.

## AGRICULTURAL SUMMARY

Competent settlers with farm experience and capital may succeed in maintaining their families and pay the farm operating expenses, but it seems improbable that inexperienced, undercapitalized, and incompetent farmers will earn enough from the land to repay construction costs. Furthermore, no reserves have been established in the foregoing farm set-ups to provide against years of serious water shortage and low crop yields. Even the best settlers would have difficulty at such times, while many weak financially would fail.

It has been assumed that 3.5 acre-feet of irrigation water will be delivered to the farm headgates each year, and crop yields are estimated accordingly. The project, however, has been planned on the basis of 3.22 acre-feet delivered to the farm headgates. Run-off records during the past six years indicate shortages

sufficient to reduce average crop yields 15 or 20 per cent below the estimated yields used in the farm set-ups.

The committee has proposed to increase the duty to 3.5 acre-feet and to meet any ordinary shortage by additional pumping and reuse. Farm expenses tend to be less in proportion to income with high yields, thus making the settlers' chance for success greater. For instance, the Oregon Experiment Station found that 3-ton alfalfa yields on these lands were obtained at a cost of \$4 a ton higher than 6-ton hay.

While somewhat larger yields than those used in this report have been obtained on some of the lands now under production on the project, it is recognized that these yields have been obtained with the use of more water than is provided for here.

*Orderly development.*—In the development of the project it is important that it should be carried on in an orderly fashion. Each division should be opened as there is need for it. On the new land it would be helpful also if some part of each farm unit could be prepared for irrigation before the settler goes on it. This would hasten returns to the settler and would be an important factor to his success.

### DUCK VALLEY IRRIGATION PROJECT

(By A. C. Cooley, senior agriculturist, Department of Agriculture, in charge of demonstrations on reclamation projects; Prof. W. L. Powers, chief of soils, Oregon State College; and Rhea Luper, State engineer of Oregon)

The Indian Service is proposing to construct a reservoir on the headwaters of the Owyhee River large enough to provide storage for sufficient water to develop 25,000 acres of land on the Western Shoshone Indian Reservation in Duck Valley. On the lower river the Bureau of Reclamation is now building the Owyhee Dam, which is to impound waters for the irrigation of 123,000 acres of land in the Snake River Valley. With the view of gathering information that would be helpful in determining to what extent the proposed development on the upper river if carried out would interfere with the development on the lower river, a committee consisting of A. C. Cooley, senior agriculturist, United States Department of Agriculture; Dr. W. L. Powers, professor of soils, Oregon State College, and Rhea Luper, State engineer of Oregon, was appointed by the Federal Commissioner of Reclamation to investigate the situation.

The committee, accompanied by George C. Kreutzer, director of reclamation economics in the Bureau of Reclamation, visited Duck Valley on June 28 and 29 to familiarize themselves with the local situation and the need for the proposed development.

The committee in the limited time it had to give to a study of the local situation looked into the economic conditions, the present agricultural development on the reservation, the irrigation system and water supply, and the need of further development.

### CONCLUSIONS

1. After an investigation of the Duck Valley project in which it is proposed to irrigate 25,000 acres of land, the committee concludes that the water supply records do not justify such a development, nor do the needs of the Indians.

2. There is need for a small storage reservoir to provide for late water and enable the reservation to control its water supply.

3. A controlled water supply with needed improvement in the present irrigation system would adequately take care of the present and future needs of the Indians.

4. A development in Duck Valley in keeping with the water-supply data and allotments already made for use on the upper river, the committee feels, would not affect in any material way the water supply of the lands under the Owyhee project now under construction. On the other hand, it might even prove beneficial to it.

*Available data.*—Available data on the weather, crops, and livestock, based on actual records kept over a period of years, are meager and incomplete. An investigation of the feasibility of the Duck Valley project was made in 1915 by H. J. Johnson, assistant engineer of the Indian Service. His report was avail-

able and was studied carefully. It was very helpful in getting a clear conception of the proposed development. The water-supply data, however, gathered since the Johnson report was made indicates that there is insufficient water for any large development.

The following table shows the available run-off record of the Owyee River near Owyee, Nev.:

Year	Run off in acre-feet
1914.....	118,000
1916.....	114,000
1922.....	111,000
1923.....	45,200
1924.....	39,600
1925.....	96,000
1926.....	30,100

*Present economic situation.*—The Western Shoshone Indian Reservation comprises an area of 277,385 acres of land in Duck Valley on the Nevada-Idaho State line. Its nearest railroad points are Elko, Nev., 120 miles to the south, and Mountain Home, Idaho, 110 miles to the north. The roads are over an arid, mountainous country, which is sparsely settled, making good roads difficult to construct and expensive to maintain.

The Indian population of the reservation is 690, made up of 363 males and 327 females. The past few years the population has been declining, due very largely to the ravages of tuberculosis among the Indians.

The principal source of income of the Indians is from livestock and outside employment. The ranches around the reservation use almost entirely Indian labor. The income from this source amounts to about \$40,000 per year, while that from livestock is given as \$52,298, and from farming as \$28,587, making a total of \$120,866, or an average family income for the 140 families living on the reservation of \$863. These Indians have no outside incomes from leases, land sales, annuities, etc., such as is enjoyed by many tribes. This undoubtedly has been to their advantage as it has forced them to depend on their own efforts and ability to make their way in the world. As a result they have developed habits of thrift and industry. This is evidenced from the large number living in houses and the personal pride they seem to take in keeping their places looking well.

*Agriculture.*—The agriculture of Duck Valley is confined almost entirely to summer grazing and hay production for winter feeding. The principal crop is wild hay with some small acreages of alfalfa, small grains, and the hardy garden vegetables.

The valley has an elevation of about 5,300 feet above sea level, with an annual rainfall around 10 inches, one-third of which falls during the growing season. A growing season of about 90 days is reported, with winter temperatures that range to 37° below zero. The climate limits the choice of crops that can be grown, and the type of agriculture that can be practiced. A study of the agricultural census gives a fair idea of the development on the reservation.

*Western Shoshone Indian Reservation, Nev., crop and livestock census summary, 1928*

CROPS

Crop	Area, acres	Total yield	Yield per acre	Unit value	Value per acre	Total value
		<i>Tons</i>	<i>Tons</i>			
Alfalfa.....	213	673	3.11	\$10.00	\$31.00	\$6,730.00
Wild hay.....	5,310	1,983	.37	8.00	2.96	15,764.00
		<i>Pounds</i>	<i>Pounds</i>			
Barley.....	10	4,900	490	.02	9.80	98.00
Oats.....	5	2,970	594	.025	14.85	74.25
Wheat.....	60	40,880	681	.025	17.02	1,021.20
Potatoes.....	10	30,000	3,000	.03	90.00	900.00
Vegetables.....	8				500.00	4,000.00
Total.....	5,616					28,587.45

*Western Shoshone Indian Reservation, Nev., crop and livestock census summary, 1928—Continued*

## LIVESTOCK

	Number	Value		Number	Value
Bees (colonies).....	None.	-----	Stallions (pony).....	None.	-----
Boars.....	None.	-----	Stallions (large).....	1	\$100
Bulls.....	6	\$350	Steers.....	600	24,000
Burros.....	None.	-----	Poultry:		
Cows and heifers.....	1,900	70,000	Chickens.....dozen..	42	252
Goats.....	20	50	Ducks.....	10	5
Hogs and pigs.....	7	100	Geese.....	7	7
Horses.....	1,200	10,000	Turkeys.....	80	240
Jacks.....	None.	-----			
Mares.....	1,800	15,000	Total value.....		136,799
Mules.....	10	700	Less 600 calves at \$15.....		9,000
Rams and wethers.....	250	1,995			
Sheep (ewes).....	1,000	8,000			127,799

The crop and livestock summary brings out the relative unimportance of the cultivated area, and emphasizes the fact that the reported yields with the exception of alfalfa are very low and uneconomical. The reason for this is given as shortage of late water with which to mature crops. Out of the 5,616 acres irrigated in 1928 only 306 acres were devoted to cultivated crops, 216 acres of which were in alfalfa, leaving only 93 acres that were actually in annual cultivated crops or gardens during the year. The area irrigated has been about the same for the past 10 years. Reports at the Indian agency list only 50 Indians as farming out of the 690 on the reservation.

It is pointed out that there is now not enough hay produced on the reservation to winter the livestock, and the Indians are required to buy several hundred tons of hay each year. In this connection it is interesting to review the livestock census and note the number of horses kept in comparison with other livestock. Number of horses reported is 3,011; cattle, 2,506; and sheep, 1,270. From the standpoint of relieving the winter hay shortage, it is quite evident that the number of horses are in excess of the Indians' needs, and could with profit be greatly reduced. Beyond the number needed by the Indians, they have no economic value and serve no useful purpose on the reservation. It is realized, however, it is not an easy matter to separate an Indian from his horse.

**Markets.**—Outside of livestock the local market absorbs all the Indians' produce. The cattle are driven to Elko, Nev., and shipped from there to Pacific coast points. Most of the sheep are moved to Mountain Home, Idaho, and from there are shipped to eastern markets or to the cities of the Northwest. The long distance to shipping points over poor roads, coupled with the handicap of climate, naturally precludes any great development of the cultivated crop enterprises. The section in which the reservation is located, as previously stated, is sparsely settled and will continue to be so, therefore the demand of the local market will necessarily always be small and limited.

**Soils.**—The wild meadowland in Duck Valley is rather heavy dark brown silty clay loam and with water control could be increased perhaps 50 per cent in productiveness by seeding in red top on lower area and alsike clover with timothy or ryegrass on the wetter drained areas. (See Oregon Agricultural Experiment Bulletin No. 167.) Water control needed includes some drainage lines from the low areas to the river at the lower end of the valley and systematic irrigation in periods instead of the present system of wild flooding. Water requirement of wild meadow is of the order of 1 acre-foot or more per ton. Wild meadow grasses included wire grass, sedge, meadows, fescue, and weeds and may cut one-half ton per acre. In the lower part of Pleasant Valley the soils are alkaline (surface pH 8.2, third foot 8.6).

The sagebrush land best suited to improvement with irrigation seems to be to the west of the agency or on the south of the wild meadow. The soil there is light brown fine sandy loam with compact gritty clay loam subsoil.

The sagebrush land north and west of the agency and north of the wild meadow is gravelly loam with gravelly clay hardpan at a depth of 10 to 12 inches. Soil texture becomes fine toward the northwest. The hardpan is general. The soil on the peninsula between the Owyhee River and Blue Creek

showed slight alkalinity (pH 7.5) in the surface and was seriously alkaline in the third foot (pH 8.4).

Change in method of handling the wild meadow in Duck Valley can be expected to be slow. An acre-foot of water there with careful use may make a ton of wild hay while the same amount with careful use on Owyhee project should make about 2 tons of alfalfa.

*Present irrigation system.*—The present irrigation system is inadequate and is undoubtedly responsible for much of the Indians' present water troubles. The diversion dams in the river are not dependable. They are constructed mostly of rock and brush, and are often damaged during high water. The type of construction makes it very difficult during low water to divert sufficient water to irrigate the land. Many of the ditches are not located properly according to grade, and they have eroded badly, causing considerable trouble in getting water through the turnouts. In much of the irrigated area the water table is high and drainage needed.

Constructing dependable diversion dams in the river, placing the laterals on better grades to eliminate eroding, and providing adequate drainage would double the efficiency of the present system and bring the quickest benefits at the least expense and interference.

*Need for new development.*—It is felt by the committee that a development in harmony with the water data compiled since 1922 and the 30,000 acre-feet of water allotment by the Oregon State engineer's office for prior rights upstream, is needed and would not interfere with the water supply of the Owyhee project on the lower river. Such a development with adequate drainage provided, it is believed, might even be beneficial to the rights on the lower river. A small storage reservoir which would give the reservation a controlled water supply and provide late water for the irrigated lands, coupled with the improvements already suggested in their irrigation system, would enable them to develop an irrigable area large enough for their present needs, and any additional ones for a long time in the future. The reservation was created in 1877, and if the interest shown in the past is any criterion for judging the future, the rapidity with which the Indians will turn to crop farming will not be great. Even with ample water there is no ground for believing that the Indian is going to develop any large cultivated area. To put 25,000 acres of land under irrigation would be inadvisable and not to the best interest of the Indian. By nature he is more interested in livestock and the things he can do on a horse than he is in the things that require any great amount of hand labor.

The reason given for developing more land in Duck Valley is to provide winter feed for livestock, making it possible to utilize the range land of the reservation to full advantage. Figuring a livestock unit as equal to one horse or cow or five sheep, the present livestock population of the reservation that consumes any great amount of hay would be equal to 5,771 animal units. It is estimated that the summer range on the reservation will take care of about 8,500 head of cattle or animal units and that it requires 1 ton of hay to carry an animal through the winter. On this basis 5,771 tons of winter feed are needed to take care of the present stock and with the summer range developed to its full carrying capacity 8,500 tons would be needed. Assuming water could be made available for 10,000 acres of land and that 4,000 acres of this area was devoted to alfalfa yielding 2 tons per acre and 4,500 acres to meadow hay yielding three-fourths ton to the acre, this would give the reservation a winter hay supply of 11,375 tons, which would more than take care of the present needs and permit a considerable expansion. The remaining 1,500 acres could be devoted to small grains and garden supplying the Indian needs along this line. An irrigated area of 10,000 acres would also provide a 40-acre irrigated tract for each of the 140 families now living on the reservation and any others that might wish to farm in the future. Such a development, the committee feels, would be justified, providing the water supply is ample and can be made available for it.

The committee after its investigation sees no reason for feeling alarmed over some development in Duck Valley and believes that any development there in harmony with the water supply and allotments already made for upstream development would not interfere with the water supply for the Owyhee project lands.

Total cropped acreage and value 1929, compared with similar figures for 1928

State and project	Lands on projects covered by crop census										Warren Act or other water service contract lands				
	1928			1929			De-crease	In-crease	1928			1929		In-crease	De-crease
	Cropped acreage	Crop value		Cropped acreage	Crop value				Cropped acreage	Crop value		Cropped acreage	Crop value		
		Total	Per acre		Total	Per acre				Total	Per acre		Total	Per acre	
Arizona: Salt River.....	219,970	\$20,062,055	\$118.57	214,750	\$25,423,030	\$118.30	\$659,025		61,000	\$6,547,130	\$107.33	\$6,547,130	\$107.33		
Arizona-California: Yuma.....	53,580	4,907,055	91.58	54,065	4,369,560	80.82	537,405		140	32,840	232.88	35,255	252.70	2,415	
California: Orland.....	13,310	759,380	57.07	12,370	503,400	40.70	255,980								
Colorado:															
Grand Valley.....	13,340	552,715	38.47	14,435	634,985	44.00		82,270	13,000	1,802,000	138.60	13,400	1,891,000	89,000	
Idaho:															
Uncompahgre.....	60,750	2,265,100	37.29	60,380	2,212,710	36.65	52,390		1,545	38,070	24.64	1,545	61,800	23,730	
Boise.....	140,260	4,938,040	33.08	150,180	5,389,330	35.85		451,200	125,700	4,485,000	35.68	128,400	5,046,500	561,500	
King Hill.....	6,220	176,620	28.33	6,375	249,560	39.15		72,940							
Minnesota:															
Gravety division.....	98,495	3,321,720	33.72	99,340	4,417,910	44.47		1,096,190	649,090	28,377,840	43.70	682,000	33,000,000	4,622,160	
Pumping division.....	55,730	1,842,630	33.07	56,730	2,478,610	43.69		635,980							
Montana:															
Huntley.....	42,765	1,479,090	34.59	42,610	1,939,300	45.51		460,210							
Milk River.....	21,800	698,430	32.04	23,485	1,037,150	44.12		338,720							
Sun River.....	15,820	211,195	13.35	18,330	975,160	25.44		763,965	22,360	473,190	21.16			473,190	
Fort Shaw division.....	24,800	388,210	16.00	27,700	426,920	15.41		38,710							
Greenfields and Big Coulee division.....	6,930	111,920	16.15	7,340	153,250	20.88		41,350							
Montana-North Dakota:															
Lower Yellowstone.....	17,870	276,200	15.46	20,360	273,670	13.44	2,020								
Nebraska-Wyoming:															
North Platte.....	19,770	499,450	25.27	23,945	779,960	32.58		280,510							
Pachinder irrigation district.....	185,650	5,455,210	29.38	183,450	7,289,140	39.73		1,833,930	103,085	4,205,375	40.79	102,200	4,831,900	626,525	
Gering and Fort Laramie irrigation district.....	80,890	2,450,790	27.26	87,995	3,242,370	36.85		791,580							
Goshute irrigation district.....	48,260	1,653,380	33.84	49,240	2,364,940	48.02		711,560							
Northport irrigation district.....	36,260	1,115,080	30.75	39,350	1,432,110	35.90		317,030							
Nevada: Newlands.....	11,240	285,060	20.99	11,355	249,720	21.93		13,760							
New Mexico: Carlisbad.....	46,085	1,773,200	38.50	46,350	2,657,280	40.04		284,080							
	23,820	1,201,160	54.21	24,220	1,847,500	76.27		556,340							

New Mexico-Texas: Rio Grande.....	130,600	12,733,650	91.22	139,775	10,957,325	78.39	1,776,325	48,070	2,431,620	48.02	49,060	1,818,760	37.00	612,860
Oregon:														
Umatilla.....	11,040	242,740	21.98	11,020	286,400	26.00	43,660	495	18,325	37.00	435	20,825	50.00	2,500
East division.....	7,125	140,240	19.68	7,440	177,590	23.88	37,360							
West division.....	3,915	102,510	26.16	3,580	108,810	30.41	6,300							
Oregon-California:														
Klamath.....	45,450	1,270,300	28.00	43,765	1,790,670	40.91	520,370	35,515	557,730	15.70	34,540	1,060,840	30.70	503,110
Main division.....	36,610	1,041,590	28.45	33,975	1,417,160	42.60	405,570							
Tule Lake division.....	8,840	228,710	25.85	9,790	343,510	35.10	114,800							
South Dakota: Belle Fourche.....	46,700	1,173,370	25.13	47,935	1,296,575	25.16	33,205							
Utah: Strawberry Valley.....	38,850	1,202,115	30.04	38,405	1,305,440	34.00	103,325	6,990	184,000	26.32	6,990	184,000	126.32	
Washington:														
Okanogan.....	3,600	1,092,725	303.73	3,835	979,220	255.35		113,505						
Yakima.....	103,140	8,242,930	79.92	101,675	12,431,920	122.27	4,188,990	124,140	13,342,200	107.00	124,390	18,515,030	147.00	4,972,830
Sunnyside division.....	80,800	5,467,160	67.38	79,075	7,947,570	100.51	2,480,410							
Tieton division.....	22,250	2,775,770	124.75	22,600	4,484,350	198.42	1,708,580							
Wyoming:														
Shoshone.....	42,980	954,760	22.21	43,270	1,270,970	29.37	316,210							
Garland division.....	34,300	792,060	23.10	33,130	1,092,330	32.97	300,240							
Frammie division.....	7,580	151,710	20.00	8,030	160,340	19.96	8,630							
Willwood division.....	1,100	10,990	9.93	2,110	18,300	8.68	7,340							
Riverton.....	1,520	6,670	12.95	2,875	10,120	11.59	3,450							
Total with irrigation.....	1,385,560	80,238,800	57.91	1,420,070	87,852,325	61.73	7,397,450	1,192,030	62,495,320	52.43	1,204,200	72,813,040	60.46	10,317,720
CROPPED WITHOUT IRRIGATION														
Milk River.....	19,100	191,390	10.02	14,140	72,180	5.11		119,210						
Sun River.....	12,970	193,140	10.50	6,310	59,120	9.36	134,020							
Fort Shaw division.....	304	3,620	11.58	1,445	1,340	9.24	2,180							
Greenfields and Big Coulee division.....	12,668	189,620	14.97	6,165	57,780	9.37		131,840						
Lower Yellowstone.....	16,880	208,800	12.37	11,970	109,980	9.18	98,820							
Klamath.....	54,730	245,620	4.46	59,760	658,440	11.00	412,820							
Total cropped without irrigation.....	103,680	838,950	8.09	92,180	899,720	9.13	60,770							
Grand total.....	1,489,240	81,077,750	54.44	1,518,570	88,752,045	58.50	7,453,200	1,192,030	62,495,320	52.43	1,204,200	72,813,040	60.46	10,317,720

1 Estimated.



DEPARTMENT OF THE INTERIOR, BUREAU OF RECLAMATION  
*Status of construction account repayments, June 30, 1929*

State and project	Construction account June 30, 1929, repayable	Value of repayment contracts	Amounts of repayment contract due on June 30, 1929	Balance of repayment contract deferred (not due)	Amounts paid on amounts due	Amounts uncollected of amounts due	Per cent repaid of amounts due
Arizona: Salt River.....	\$10,160,021.97	\$10,166,021.97	\$5,280,331.45	\$4,879,690.52	\$5,286,331.45	-----	100
Arizona-California: Yuma.....	9,514,325.54	5,015,287.70	3,257,480.07	1,807,807.63	3,108,946.52	\$88,534.55	97.3
California: Orland.....	2,355,280.79	2,432,342.95	630,714.74	1,845,628.21	620,740.94	15,973.80	97.5
Colorado: Grand Valley.....	4,063,760.78	999,768.00	39,990.72	959,777.28	28,901.72	11,089.00	72.3
Idaho: Uncompahgre.....	5,433,113.28	5,510,805.93	555,864.77	4,954,941.16	449,693.72	145,171.05	75.2
Idaho: Amarican Falls.....	7,625,034.66	6,127,795.08	3,379,061.73	2,748,734.25	3,379,061.73	-----	100
Idaho: Boise.....	15,726,530.07	14,085,537.38	3,008,279.20	11,687,558.18	2,993,074.78	8,650.00	99.5
King Hill.....	1,489,963.94	1,489,963.94	8,650.00	1,481,313.94	-----	-----	-----
Minnesota: Minidoka.....	5,784,834.73	6,301,229.68	4,187,121.64	2,114,108.04	4,077,323.53	109,798.15	97.4
Montana: Minidoka gravity extension.....	373,541.92	5,223,500.00	140,000.00	5,083,500.00	100,000.00	40,000.00	71.4
Montana: Huntley.....	1,859,757.99	1,700,364.66	527,172.34	1,203,192.32	527,172.34	-----	100
Montana: Milk River.....	5,301,603.30	5,912,019.00	-----	6,012,019.00	-----	-----	-----
Sun River.....	6,811,857.34	10,012,837.24	185,627.72	9,827,309.52	181,975.23	552.49	99.7
Montana-North Dakota: Lower Yellowstone.....	3,904,997.37	4,164,248.92	152,483.53	4,011,765.39	152,177.72	305.81	99.8
Nebraska-Wyoming: North Platte.....	21,083,683.45	22,265,958.43	2,735,492.00	19,529,506.43	2,538,794.99	170,097.01	93.5
Nevada: Newlands.....	3,484,709.54	3,299,558.05	886,227.93	2,413,330.12	885,109.09	1,118.84	99.9
New Mexico: Carlshad.....	1,422,841.31	1,425,182.75	703,714.62	631,468.13	759,431.31	34,283.31	95.7
New Mexico-Texas: Rio Grande.....	12,971,423.26	13,255,300.00	2,200,769.36	11,054,530.64	2,082,269.36	168,500.00	92.3
Oregon: Baker.....	63,334.33	-----	-----	-----	-----	-----	-----
Umatilla.....	4,452,425.41	3,814,528.04	420,303.81	3,394,225.13	375,911.97	44,391.84	89.4
Vale.....	1,300,251.04	4,500,000.00	-----	4,500,000.00	-----	-----	-----
Oregon-California: Klamath.....	5,246,525.86	3,760,540.69	967,548.88	2,792,991.81	901,447.99	66,100.89	93.2
Oregon-Idaho: Owyhee.....	1,604,753.13	18,000,000.00	-----	18,000,000.00	-----	-----	-----
South Dakota: Belle Fourche.....	4,127,172.91	4,231,433.07	552,811.91	3,698,621.16	552,811.91	-----	100
Utah: Salt Lake Basin.....	1,364,701.22	3,000,000.00	-----	3,000,000.00	-----	-----	-----
Strawberry Valley.....	3,331,243.04	3,238,235.57	992,603.94	2,245,631.63	992,603.94	-----	100
Washington: Oranogan.....	424,198.97	424,198.97	120,365.61	303,833.36	120,365.61	-----	100
Yakima.....	14,068,408.53	11,571,097.77	5,714,477.11	5,856,620.66	5,470,903.24	237,573.87	93.8
Yakima-Kittitas.....	4,905,902.71	9,000,000.00	-----	9,000,000.00	-----	-----	-----
Wyoming: Riverton.....	3,354,923.82	-----	781,300.65	4,797,731.25	733,457.87	47,842.78	93.9
Shoshone.....	8,135,468.41	5,679,031.90	-----	-----	-----	-----	-----
Total.....	171,790,701.72	186,360,185.49	37,660,293.73	148,825,891.76	36,348,505.96	1,211,787.77	96.8

For detail of amounts stated in this column see Table 4 of financial table in Annual Report of Commissioner of Reclamation for fiscal year ended June 30, 1929.

# INDEX

## A

	Page
Achievements of Federal reclamation.....	24
Acreage cropped and value.....	308, 309
Action desired by projects.....	30
Adams, Prof. Frank.....	159, 181
Alfalfa Valley irrigation district, Montana.....	87
Allocation of cost of major works.....	44
Allowable indebtedness under constitution of Irrigation States.....	62
Appendix.....	59, 67
Arizona.....	62
Assessing the project costs.....	47
Assignment of investigators.....	28

## B

Basis of approval for new projects.....	44
Belle Fourche irrigation district.....	30, 68
Belle Fourche irrigation project.....	68
Bitter Root irrigation district, Montana.....	38, 227
Botkin, T. W.....	97
Bretthaupt, L. R.....	108, 283
Burke, W. J.....	68

## C

California.....	62
Casper-Alcove project.....	12
Character of Federal reclamation policy.....	24
Chase, William F. B.....	202
Chinook division, Milk River project, Montana.....	7
Colorado.....	63
Construction account repayment.....	310
Control of settlement of private lands.....	50
Cooley, A. C.....	283, 304
Credit problem.....	50
Cropped acreage.....	308, 309

## D

Dean, H. K.....	108
Debler, E. B.....	117, 119
Dent, P. W.....	19, 117, 119
Duck Valley irrigation project.....	304

## E

Economic survey of certain Federal and private irrigation projects.....	23
Economic survey recommended.....	27
Emmett irrigation district, Idaho.....	125

## F

Facts concerning projects included in economic survey of reclamation.....	59
Federal aid to irrigation districts and other private projects.....	57
Federal reclamation.....	1
Fort Belknap irrigation district, Montana.....	86

## G

	Page
Gem irrigation district, Idaho.....	38, 210
Grand Valley project, Colorado.....	159
Greensfield division (Sun River project, Montana).....	250

## H

Hanser, L. A.....	234
Harlem irrigation district, Oregon.....	36, 202
Hayden, B. E.....	273
Hermiston irrigation district, Oregon.....	97, 109
Houghton, A. C.....	103
Horsefly irrigation district, Oregon.....	36, 202
Hyslop, G. R.....	108

## I

Idaho.....	63
------------	----

## J

Jackson, E. L.....	97
Jewett, F. L.....	97
Johnson, Dr. Alvin.....	88, 271
Johnson, H. H.....	250
Johnston, W. W.....	125, 152, 210, 218

## K

King Hill irrigation project, Idaho.....	152
Klamath project, Oregon.....	181
Kreutzer, George C.....	117, 119

## L

Lands designated by Secretary of the Interior as temporarily and permanently unproductive.....	45
Land of low production.....	46
Lower Yellowstone project, Montana and North Dakota.....	39, 41, 262
Luper, Rhea.....	283, 304

## M

Madden, New.....	97
Malin irrigation district, Oregon.....	43, 181
Malta division.....	243
Mead, Dr. Elwood:	
Report of.....	1
Letter from, to members of Denver conference.....	5
Milk River project, Montana.....	31, 40, 77
Chinook division, Montana—	
Malta.....	243
Glasgow.....	243
Mitchell, L. H.....	77, 243
Montana.....	63

## N

Nature of requests that have been submitted.....	28
Nevada.....	64
New Mexico.....	64
North Dakota.....	64
Northport division on the North Platte project, Nebraska and Wyoming..	88
Northport irrigation district.....	32
North Platte project.....	32

## O

	Page
Orchard Mesa irrigation district, Colorado.....	35, 159
Oregon.....	65
Ott, H. J.....	97
Owyhee project, Oregon and Idaho.....	42, 283

## P

Palo Verde irrigation district, California.....	39, 234
Paradise irrigation district, Montana.....	83, 85
Pertinent facts concerning projects included in economic survey of reclamation.....	59
Powers, Prof. W. L.....	108, 283, 304
Principles which have governed the recommendations of the advisers.....	29
Private districts purchasing water or power from the Government.....	35
Private projects aided by Government.....	33
Private projects requesting aid from Government.....	38
Project women and home conditions.....	58
Projects not making specific requests but investigated.....	39

## R

Reclamation credit institution.....	51
Reclamation States, population, wealth, etc.....	62
Recommendations as to policy.....	44
Recommendations of the advisers.....	30
Responsibility of the United States under Warren Act contracts.....	55
Repayment of construction accounts.....	310
Rio Grande project, New Mexico and Texas.....	3
Riverton project, Wyoming.....	41, 271

## S

Sanford, George O.....	227, 262
Scope of report.....	26
Scott, George W.....	234
Settlement.....	49
Settlement and agriculture advisers.....	53
Shasta View irrigation district, Oregon.....	35, 181
Shoshone project, Willwood division, Wyoming.....	42, 273
South Dakota.....	65
Stanfield irrigation district, Oregon.....	37, 119
Stanfield outline survey.....	114
State participation in reclamation activities.....	54
Stoutemyer, B. E.....	117, 119, 125, 210
Status of construction account repayments.....	310
Suu River project.....	18, 39, 250

## T

Table.....	308, 309, 310
Texas.....	65
Total cropped acreage and value.....	308, 309

## U

Umatilla project, Oregon.....	32
East division.....	97
West division.....	103
Uncompahgre project.....	4
Utah.....	66

## V

Value of cropped acreage.....	308, 309
-------------------------------	----------

## W

	Page
Washington-----	66
West extension irrigation district, Oregon-----	103, 112, 117
Westland irrigation district, Oregon-----	37, 117
Westland outline survey-----	112
Wilbur, secretary Ray Lyman, letter from-----	1
Williams, Ed F-----	234
Willwood division (Shoshone project, Wyoming)-----	273
Wyoming-----	66

## Y

Youngblutt, F. C.-----	68
------------------------	----

## Z

Zurich irrigation district, Montana-----	83
--	----

## O



LIBRARY OF CONGRESS



0 014 132 581 4

